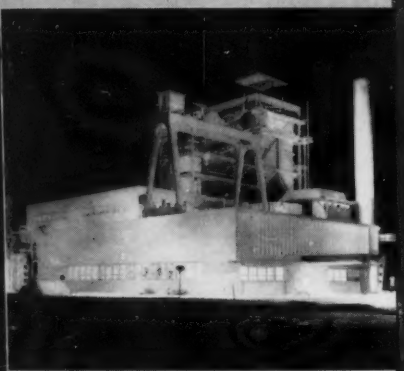
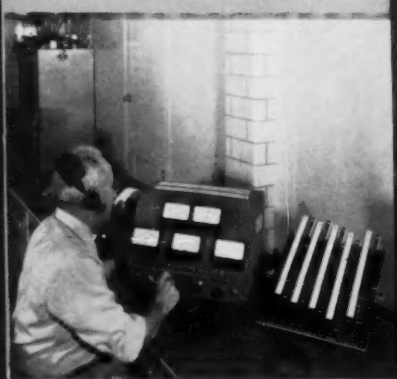
EDP—A Challenge 74



Nevada's First 78



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ELECTRICAL WEST

March 1956

25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

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Get an electric range,
and cook the best way
every day!
SEE YOUR DEALER
Switch to Cooking Perfection... Electrically!
SET IT—AND FORGET IT. Setting the controls on your electric range puts into every dish the final ingredient which assures perfect results automatically—really dependable accuracy of cooking heat and cooking time. You get far more cooking control electrically than any other way.
Join the millions of homemakers who are switching to electric ranges this year. You don't have to be a prophet to see what's ahead for them. It is easier cooking—and better cooking—electrically!
Edison
Good Service, Square Dealing, Courteous Treatment
SOUTHERN CALIFORNIA EDISON COMPANY

Perfect switch!

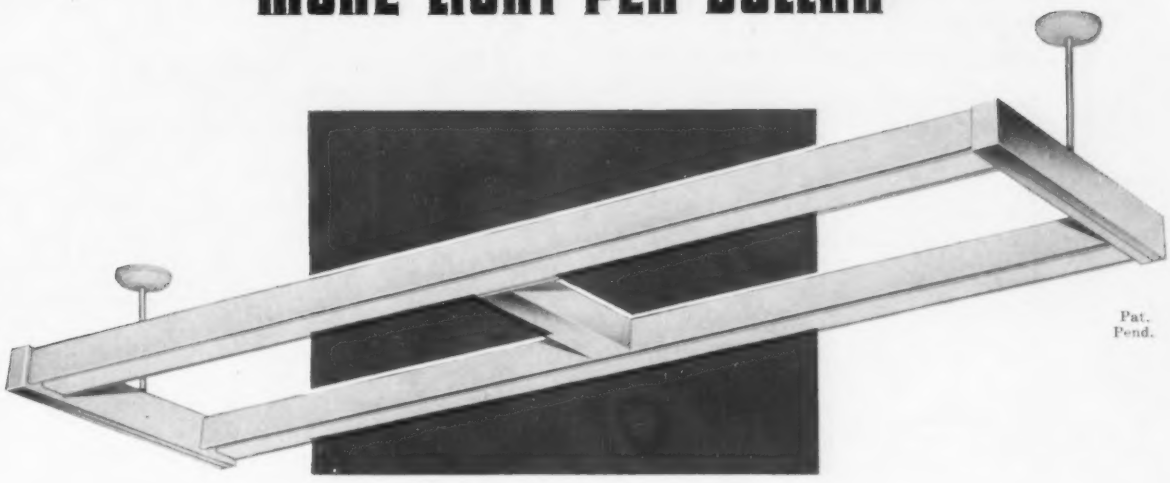
Looking for the word which has more appeal than any other to modern homemaker-cooks? We nominate this one: "Perfection" . . . what they are hoping for in every dish for every meal, every day. Perfection is what an *electric* range delivers best! The superiority of its control over cooking times, temperatures and quality is unquestioned.

We're telling this appealing—and true— story to homemakers in Edison territory with a series of advertisements like the one shown here. They're attracting attention and directing customers to the stores of electrical appliance dealers. That's where the sales are being made. Alert dealers are tying in . . . and cashing in!

Good Service, Square Dealing, Courteous Treatment Edison

Southern California Edison Company

MORE LIGHT PER DOLLAR



Pat. Pend.

WITH REVOLUTIONARY NEW SMOOT-HOLMAN

PERFECT VISION

LUMINAIRE USING NEW 800 MILLIAMPERE LAMPS

Totally new in conception, design, performance. Takes full advantage of the high output of new 800 MA., rapid start lamp. The only indirect luminaire available that *mounts within 12 inches of ceiling without severe light blocking.* Slender lines and open construction pass amazing percentage of upward light back to work surface . . . Gives you *far more light per dollar* than ever thought possible. Louvering effect of fixture subdues ceiling brightness. No pronounced ceiling pattern. Faultless light distribution; its comfort and quality astonishes everyone.

By all means, investigate this exciting new fixture promptly. The more you know about it, the more use you'll find for it. Its possibilities are limitless. Where shall we send your complimentary file of technical data? Kindly mention this publication and our catalog number, PV-288.

Features

- **Upward and downward light balanced for best seeing.**
- **High efficiency.**
- **Brightness meets ASA school lighting standards.**
- **Mounts within 12" of ceiling without blocking return light.**
- **Near perfect visual comfort in any size room.**
- **High adaptation level yet low brightness and brightness ratios.**
- **Economical to install.**
- **Easy to maintain.**
- **Harmonizes well with modern architecture.**
- **Extremely flexible in arrangement.**

SMOOT-HOLMAN COMPANY

INGLEWOOD CALIFORNIA

ILLUMINATION EQUIPMENT SMOOT-HOLMAN INGLEWOOD CALIFORNIA

We Support the National Lighting Bureau

OUR SERVICE IS LIMITED TO THE WEST AND SOUTHWEST

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity."

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Next Month

Our important industrial issue is coming up in April. Leading articles will cover automation, closed-circuit television and policy on higher utilization voltages. Also there will be a number of shorter precision industrial applications in the Far West that will be of value to industrial power salesmen, consulting engineers and electrical contractors—plus regular features.

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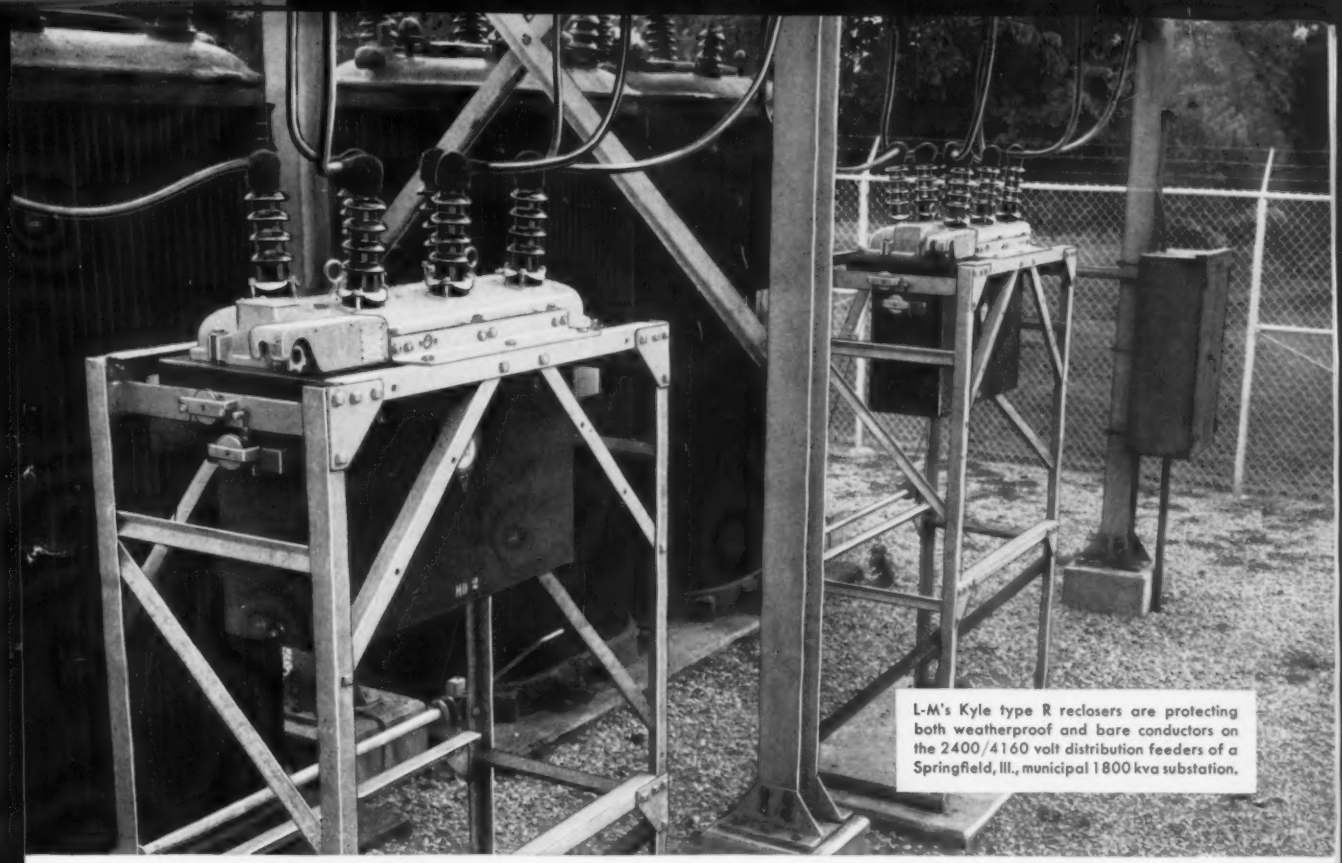


L-M's Kyle type R reclosers are protecting both weatherproof and bare conductors on the 2400/4160 volt distribution feeders of a Springfield, Ill., municipal 1800 kva substation.

Improve Service Continuity . . .

High-Speed Kyle Type R Reclosers Reduce Conductor Burn-Down

by **FRANK McSTAY**
Product Manager
Kyle Products
Line Material Company

The operating speeds of conventional circuit breakers in many cases do not interrupt transient faults fast enough to prevent burn-down of weather-proof conductors or loss of mechanical strength of bare conductors. For this reason, Line Material Company engineers have designed fault-protective devices with extremely fast opening characteristics that will *minimize permanent system faults* resulting from transient or non-persistent causes.

Reduce Damage Caused By Transient Faults

L-M Kyle reclosers are completely automatic and self-contained. They provide high-speed circuit clearing (2-cycle maximum). Up to 90% of transient or non-persistent faults can be cleared by Kyle reclosers with no significant damage to the system or interruption of service continuity.

Ratings from 25 to 400 Amps.

The Kyle type R heavy-duty three-phase oil circuit recloser, shown above, is designed to replace breakers in substations with up to 100,000 kva fault capacity. They are available in normal load ratings from 25 to 400 amperes, with symmetrical RMS interrupting rating up to 6000 amperes at 4.8 kv and below and 4000 amperes up to 14.4 kv.

Almost any supplementary relaying scheme is adaptable to the type R recloser for substation application. Units are available with ground tripping, shunt tripping, shunt lockout, and auxiliary switches for remote control indication or low-voltage control switching.

Kyle Type R 3-Phase Reclosers available in normal load ratings FROM 25 TO 400 AMPERES

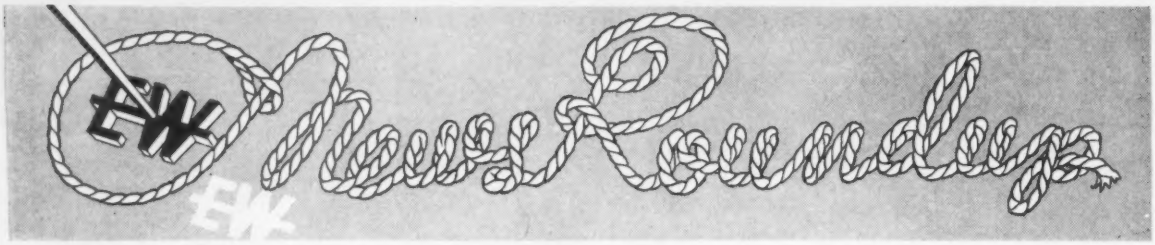
Ratings Amps.	Min. Trip Amps.	Inter. Ratings RMS Amperes 4.8 kv	14.4 kv
25	50	1500	1500
35	70	2100	2100
50	100	3000	3000
70	140	4200	4000
100	200	6000	4000
140	280	6000	4000
160	320	6000	4000
185	370	6000	4000
225	450	6000	4000
280	560	6000	6000
400	800	6000	4000

Get the Whole Story On L-M's Kyle Reclosers and Sectionalizers

Ask your L-M Field Engineer for information and bulletins on Kyle apparatus and complete coordination—single and three-phase—from substation to load. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto, Ontario.

248

LINE MATERIAL Kyle® Reclosers
A McGRAW ELECTRIC COMPANY DIVISION



SIGNIFICANT ITEMS FROM THE EDITORS' NOTEBOOKS

NO DEFENSE was put up by the U. S. Government in a trial reported on page 128, and the decision of the judge is that the government is illegally impounding water behind Friant Dam.

U. S. Judge Peirson Hall, in another opinion, expressed "surprise and bewilderment" that the Department of Justice had boycotted the proceedings. He feels the government may have forfeited its right to appeal the case.

Defense or not; appeal or not; the case raises some interesting questions that will have legal minds playing musical chairs for a while.

-EW-

We're trying to reconcile recent headlines forecasting a 1958 power shortage in the TVA area with a 10-year TVA contract with Reynolds Metals Co. The contract calls for up to 250,000 kw a year for the planned new Listerhill, Ala., aluminum reduction plant. It also has renewal provisions.

-EW-

ALUMINUM WIRE in transformers is about to get more practical testing.

About 42 miles of aluminum wire will be in what will be the world's largest aluminum-wound transformer. It is being made for Aluminum Co. of Canada by English Electric Co. at St. Catherines, Ontario. The 70,000-kva unit will go into Alcan's smelter at Kitimat. Total weight of the wire will be about 11,000 lb.

-EW-

PRODUCTION NOTES—Supplies of steel, copper and aluminum, the basic raw materials of the electrical industry, apparently will keep pace with the general industrial growth of the nation.

The steel industry is planning a 15,000,000-ton increase in capacity over a three-year period at a cost of more than $3 billion. This would bring the industry's total productive capacity to 143,000,000 tons annually. Production last year was 117,000,000 tons, far in excess of anything before in history and well above the top World War II figure of 92,000,000 tons annually.

The Anaconda company has notified the Chilean government that one of its subsidiaries would spend nearly $53,000,000 to bring in a newly discovered copper ore body in that country. Roy H. Glover, Anaconda's chairman, commented that it will be the most important development in Chile copper mining since the Chuquicamata mines were opened in 1914.

Incidentally, copper prices were raised to 46c a pound—the highest domestic price in 91 years.

Aluminum expansion has pushed the industry's total capacity to above 700,000 tons annually. The Aluminum Co. of America is said to be finalizing plans for an additional capacity of 150,000 tons annually in a plant that probably will be located in the Ohio Valley.

-EW-

Some government officials are pushing for more home rehabilitation as another prop to the economy. Pressure may develop in Washington to increase federally backed loans for home modernization from a three- to five-year period and to raise the ceiling to $3,500. It's a trend well worth noting by electrical contractors and dealers—and couldn't be a better tie-in for the industry's new "Live Better . . . Electrically" campaign.

-EW-

POSITIVE APPROACH—The Southern California Edison Co. has expressed itself as being ready, willing, and able to supply underground service to all customers—for a price.

This inference can be gained from the fact that the company has applied to the California Public Utilities Commission for a new rate which would apply when it is requested to furnish service from underground distribution circuits installed at its expense but not required for its operating convenience.

Surcharges would be applied to both fixed and energy components of the rate, said surcharges to be added to the applicable rate schedules for overhead service. For full details see page 124.

-EW-

POWER COST OF 7.5 MILLS per kwh is expected from the 180,000-kw dual cycle boiling water reactor power plant being built by G-E for Commonwealth Edison, aided by Pacific Gas and Electric Co., Bechtel Corp. and eastern utilities.

This statement was made by J. Harris Ward, vice-president of Commonwealth.

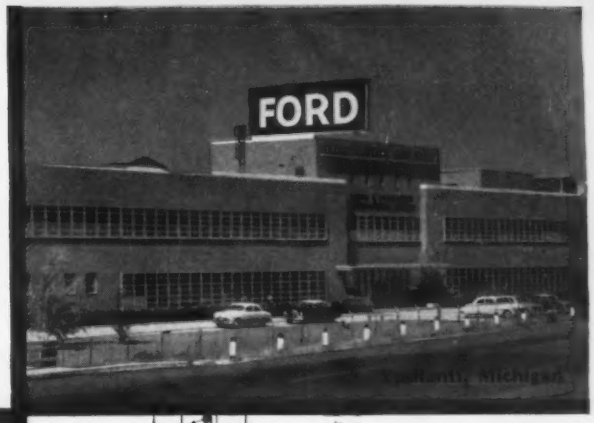
Cost of the plant will be $45,000,000, of which $30,000,000 plus overhead will be in Commonwealth plant account. The 7.5-mill power cost includes fixed charges, operating expenses and nuclear fuel. This is about the same as cost of power from Commonwealth's *new* coal-fired plants.

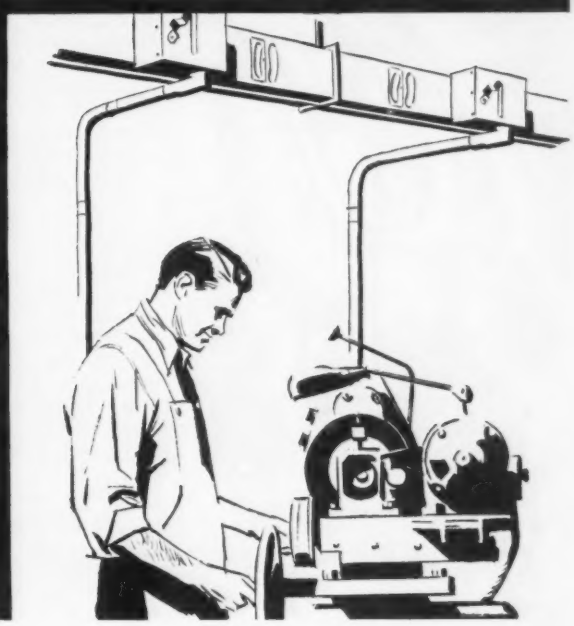
If a $15,000,000 development cost being absorbed by Commonwealth and associates is added, total power cost will be about 1c. Because of extraordinary development cost included in this first plant, they believe there is a good chance that subsequent nuclear plants of the type they are building will be competitive with coal-fired plants.

-EW-

ATOM NEWS—Insurance for privately operated nuclear energy reactor installations may soon become available. Three groups of insurance companies have announced plans to organize into syndicates to spread the risks incidental to the operation of such facilities. Two of the new syndicates, composed of stock insurance companies, will be in a position to underwrite "third party" liability and physical property damage liability, respectively. A third syndicate will be a reinsurance pool of more than 91

FORD SAVES OVER 3,000,000 POUNDS OF CRITICAL COPPER





...you, too, can save by using BULLDOG ALUMINUM BUStribution Duct

Five years ago, visionary plant engineers at Ford Motor Company were among the first to approve aluminum conductors as an alternate for copper in BullDog BUStribution® systems. This enlightened thinking has now led to a savings of over *3 million pounds* of copper by Ford . . . permitting this critical material to be diverted to defense and other areas.

But saving copper is just half the story. Pioneered by BullDog, BUStribution Duct with aluminum bus bars costs less initially . . . is easier to install . . . operates with top efficiency and safety. Its lighter weight reduces the strain on building trusses and supporting members . . . makes it easier to relocate when plant layout must be changed.

Follow Ford's lead. Install BullDog "Lo-X"® and Plug-in BUStribution Duct with aluminum conductors in your plants. It's the modern, economical way to get flexible, efficient power distribution—and help conserve America's dwindling copper resources, too. Consult a BullDog field engineer or write to BullDog Electric Products Co., Detroit 32, Mich.

© BEPCO

IF IT'S NEW... IF IT'S DIFFERENT... IF IT'S BETTER... IT'S **BULLDOG**

ELECTRIC PRODUCTS COMPANY

A Division of I-T-E Circuit Breaker Company

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THE TIME PROVEN
1929

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THE UNCHALLENGED
LEADER IN ITS CLASS

THE PORCELAIN PRODUCTS 1929 WIREHOLDER IS THE "STANDARD", BECAUSE OF:

Good Basic Design √
Sound Engineering √
Uniform High Quality √
Competitive Pricing √
Dependable Service √
Up-to-date Packaging √

Plus a complete, quality line of secondary service materials!

62 Years
Electrical Porcelain Since 1894.
PP INC.
Porcelain Products, Inc.
FINDLAY, OHIO

mutual fire-casualty companies. Premium costs have not yet been announced.

Russia has announced the intention of building atomic power stations having a total capacity of between 2 and 2½ million kw between 1956 and 1960. This compares to current U. S. commitments in nuclear generating stations of 689,000 kw for the same period.

Kenneth Kasschau, manager of atomic energy engineering for Alcoa Products, told the National Rural Electric Cooperative Assn. that the new 2,000-kw Army package power reactor will cost about $1,000 per kilowatt and will produce power for a total cost of 16.1 mills per kwh. He also estimated that a 10,000-kw version could be built for a cost of about $400 per kw.

-EW-

Former AEC Chairman Gordon Dean is quoted as stating the idea of atomic propulsion for cars, trucks and buses is fantastic. At the rate Americans crack up their vehicles, most highways would become radioactive in a short time.

-EW-

Don't bet on how much electric power, generated from the atom, has been sold commercially. Total production from the West Milton, N. Y., submarine prototype reactor that was sold over the lines of the Niagara-Mohawk power system was 12,000 kwh, approximately $36 worth.

-EW-

Its own built-in tiny transformer energizes the new low-voltage remote-control relay for lighting, just announced by Remcon and predicted in a recent Contractors' News Letter. See this month's CNL for details.

-EW-

BLACKS OUT—It shouldn't have happened to Fischer Black, the one electrical paper editor on the big-time "Live Better . . . *Electrically*" nationwide closed-circuit TV broadcast Feb. 8, but it did.

West of Denver Black was blacked out for all but the final goodbye glimpse during his talk representing the industry's press as editor and publisher of *Electrical World*.

Editor Black has often made it over the Rockies before in person. What perversity got into this electrical device to black him out this time? *(His message came through though—good ol' radio.)*

-EW-

A CHALLENGE TO MANAGEMENT is what Everett Calhoun calls the adaptation of electronic data processing systems to electric utilities in his article on page 74.

Calhoun, who is manager of EDP research for Stanford Research Institute's Economics Department, tells about the policy thinking and planning necessary to get the larger machines working economically for industry. He presents workable planning procedures and approximate schedules, plus some interesting commentary on capabilities of the "hardware" you'll be hearing about soon.

-EW-

Ole Svensen, our mythical line crew foreman, advises new grunts: "Remember—the boss ain't always right, but he's always boss."

-EW-

EXPERIENCE WITH 13.2-KV PRIMARY distribution to date has been excellent, reported A. J. Pansini of the Long Island Lighting Co. to the AIEE winter general meeting.

"This can be attributed to more care in laying out the location of lines, better tree clearance, greater conductor spacing and, in general, simplified construction, based on good engineering practice.

Fast breaker operation coupled with proper fuse coordination, which limits fault duration thus preventing excessive damage, also contributed much to successful performance of these lines.

It is felt that the higher voltage distribution system has justified the selection of 13.2 kv as a primary voltage."

-EW-

From a recent ELECTRICAL WEST *reader survey came this succinct reply, "Mr. ..... is no longer here. He didn't read it when he was here!" Could it be "because?"*

-EW-

PARTNERSHIP IS GAINING GROUND in the Pacific Northwest.

Last month we reported that Puget Sound Power & Light signed two partnership contracts with Chelan PUD. In the news section this month you'll see where Puget has also reached agreement with Douglas County PUD over devopment of the Wells project.

Seattle City Light is making progress toward a three-way pact with Pend Oreille PUD and Aluminum

NEW

CHANCE Type F CUTOUT
meets all your present and future requirements

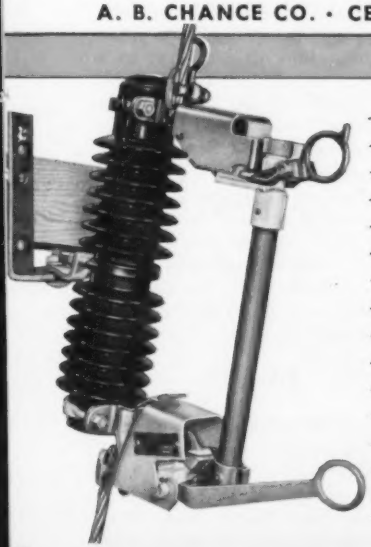
11 possible combinations with 1 fuse mounting 5.2, 7.8, 15 kv Ratings

One fuse mounting—interchangeable fuseholders give you 100 or 200 amp regular or 100 amp load break cutouts—interrupting capacities 2000 to 12000 amps, plus a disconnect

Here's a way to simplify your cutout stocking problems—lower storage, handling and installation costs. With the Chance Type "F" line of cutouts, you stock only one type of fuse mounting and a choice of fuseholders for complete system protection. You can choose from *eleven* different combinations, including a disconnect, to fit your exact needs. And when you want to up-rate an installed cutout or convert it to load break, a simple change of fuseholders does the job—*in the same fuse mounting!*

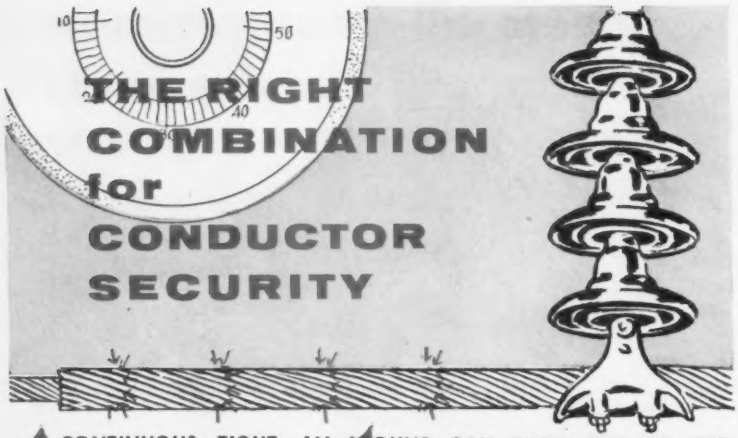
The Type "F" Cutout combines 16 important features asked for by distribution engineers in a nationwide field check . . . and *only* the Chance Type "F" offers *all* these features! Check the table below. Ask your Chance Distributor to show you this new Cutout line, or write us.

A. B. CHANCE CO. • CENTRALIA, MISSOURI • San Francisco, California • Pittsburgh, Pennsylvania



	Chance Type "F"	Cutout "G"	Cutout "H"	Cutout "I"	Cutout "J"	Cutout "K"	Cutout "L"	Cutout "M"
Interchangeable Fuseholders Covering Complete NEMA Range	YES	NO	YES	NO	NO	YES	NO	NO
Wrap Around Insulator Bolts	YES	YES	NO	YES	YES	NO	NO	NO
Bird Proof Construction	YES	YES	YES	YES	NO	YES	NO	YES
Lift and Tie Ring	YES	NO	NO	NO	NO	NO	YES	YES
Universal Terminals	YES	YES	NO	YES	YES	YES	NO	NO
Sleet Hoods at Both Ends	YES	YES	NO	YES	NO	NO	NO	NO
Positive Guiding of Tube	YES	YES	YES	YES	NO	YES	YES	YES
Positive Latch	YES	NO	NO	NO	NO	NO	YES	NO
All Contact Surfaces Silver Plated	YES	YES	YES	YES	NO	NO	YES	YES
Self Cleaning Contacts	YES	YES	YES	YES	YES	NO	YES	YES
Lever Action When Opening	YES	NO	NO	NO	NO	NO	NO	NO
Link Ejector	YES	NO	NO	NO	NO	NO	YES	YES
Load Break	YES	YES	YES	YES	YES	YES	YES	NO
Fuseholder Cannot be Installed Backwards	YES	YES	NO	YES	YES	YES	YES	YES
180° Stop to Prevent Fuseholder Swinging Back into Pole	YES	NO	NO	YES	YES	NO	NO	YES
NEMA Standard Mounting Bracket	YES	YES	YES	YES	YES	YES	YES	YES

6-6



CONTINUOUS, TIGHT, ALL-AROUND GRIP FROM END TO END

the overhead conductor + fine FANNER superformed ARMOR RODS

UNIFORM FULL-LENGTH GRIP

Fanner Superformed armor rods contact conductor permanently and tightly *at every point* — not just at clamps.

COMPLETELY EFFECTIVE ARMORING

Exclusive, precision formed construction provides rugged, lasting protection for conductor.

DEPENDABLE PERFORMANCE

Every installation fits perfectly into place. Fanner precision design eliminates special skill on part of lineman.

RE-USABILITY

When reconductoring or line relocation demands it, Fanner Superformed Rods may be reapplied without rod waste or loss of armoring.

LOW INSTALLED COST

Fine Fanner Superformed Rods provide both initial and long term economy through low cost, easy application and multiple capabilities.

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THE FANNER MANUFACTURING CO.

Brookside Park • Established 1894 • Cleveland 9, Ohio

AGENTS IN PRINCIPAL CITIES

ARMOR RODS • TAP ARMOR • LINEGUARDS • PATCH RODS

Co. of America for power from the Box Canyon development.

Still cooking are negotiations of Grant County PUD for sale of power from the proposed Priest Rapid project.

-EW-

FLOOD DAMAGE—Some idea of the damage done by the floods in Sutter and Yuba Counties of California is graphically shown in the Colgate Division *PG and E Dealer Bulletin* in late January.

"It has been estimated we have 4,300 such appliances in warehouses and over 3,000 television sets to be repaired. Some refrigerators and freezers have never been found and still others were discovered three and four blocks from their original location.

"Considering that the 6,500 homes flooded had from two inches of water to complete coverage, it is unknown how many appliances will be affected. Many owners have repaired and cleaned their own appliances and now have them back in operation."

About 300 homes were completely destroyed and more than 1,000 received severe structural damage.

-EW-

RCA's David Sarnoff has suggested a National Educational Reserve of qualified science teachers drawn from the ranks of industrial workers. He also proposes that qualified persons above the retirement age could be used effectively to relieve the shortage of teachers.

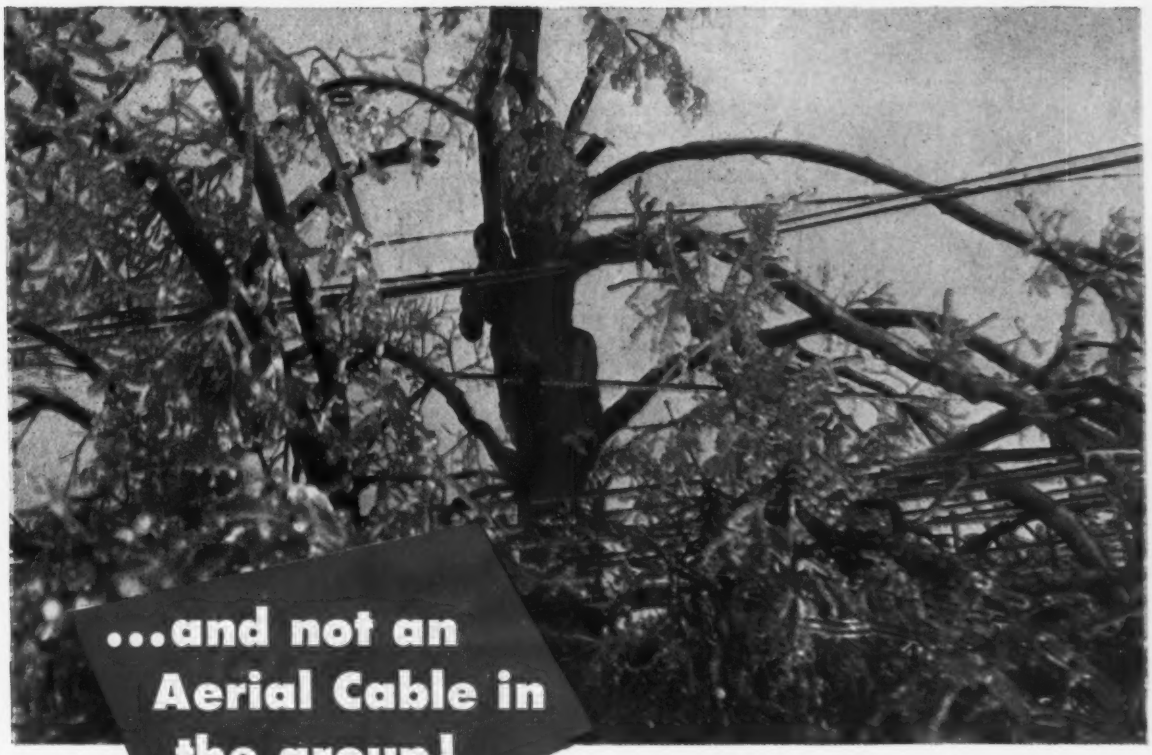
-EW-

INDUCTION LIGHTING—Applying the principles of induction heating, common now in industry, to a tiny ceramic target, Sylvania Electric Products has developed what it calls the "RF lamp," an entirely new light source of exceptionally high intensity and uniformity.

First shown in Hollywood, applied for high-speed printing of motion picture film, this intense point source offers many other applications. Included are color TV, medical research, radar and air traffic control, computers and projectors.

-EW-

COLOR COMPLEX—Put a group of salesmen without watches into a room painted bright red and hold a three-hour meeting. They will guess that the meeting lasted *twice that long*. A similar experiment performed



From the viewpoint of a distribution superintendent, this is a pretty sad and pretty numbing picture. It shows vividly what nature can do when the conditions are just right. Here, if any place, is an ideal location for a Simplex Neoprene-Jacketed, Self-Supporting Aerial Cable.

It is at times like these that Simplex Self-Supporting Aerial Cables dramatically present their dependability. They have a dependability factor almost as high as cables in underground ducts. Even if whole trees fall on them, their strong copperweld supporting messenger will keep them from breaking. Because they are insulated, the public is not endangered by exposed open wires.

Even if you never have had a storm like this, you still need Simplex Self-Supporting Aerial Cables because they reduce your tree-trimming costs. Swaying branches are no problem for the neoprene-jacketed, Anhydrex-insulated conductor. Special tree wire is unnecessary. They raise the utility in the estimation of its customers by providing a neat, good-looking package.

Simplex Self-Supporting Aerial Cables are easy to splice and tap, and they are readily identified as to phase. Their long service life recommends them most highly to budget-conscious distribution engineers.

If you would like to know how to save money by spending a few dollars for Simplex-ANHYDREX Self-Supporting Aerial Cable, simply address the nearest Simplex branch or the address below. You will be most happy that you did.

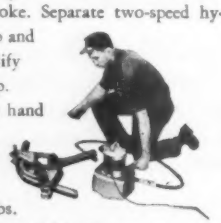
Simplex

Self-Supporting Aerial Cables

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

full 90° bend with one stroke of the ram . . . easy portability . . . extra versatility

Here's the kind of real portability you've been looking for in a bender for ½" to 2" pipe and conduit. Using light, but strong, aluminum alloy for many parts, the new GREENLEE No. 880 Hydraulic Bender is unusually *lightweight*, yet extra rugged, fast, powerful . . . produces 15 tons of ram force! One man can easily carry and operate it to quickly make uniform bends. Complete 90° bends can be made with one ram stroke. Separate two-speed hydraulic hand pump and bending ram simplify handling and setup. Easily operated by hand or may be teamed with a GREENLEE Power Pump for fast production jobs.



Attachments also available for bending thin-wall conduit, tubing, bus-bars. Get complete details on how to speed jobs and get better results with the new GREENLEE No. 880 Bender. Write for Bulletin E-217.

GREENLEE

GREENLEE TOOL CO.
1763 Columbia Ave., Rockford, Illinois

in a blue room will produce a collective guess that the meeting lasted less than three hours.

In another experiment several workers told their foreman that they liked the new pale green light-weight tool boxes much better than the old heavy black ones that they previously used. The catch was that the tool boxes were identical except the black exteriors had been secretly converted to the pastel color over the week end.

All of this indicates that color can produce definite psychological effects. Maybe our home service people and home lighting sales personnel will have to become color psychologists, too.

-EW-

Down in the Southwest, they are studying the feasibility of using organic compounds to form a protective film over reservoirs to retard evaporation. Similar experiments in Ceylon and Australia have shown promise. Water savings could be enormous if a compound that would satisfy, health, wild life and appearance requirements could be found.

-EW-

TRUE TODAY as it was 32 years ago—

"I wish I could show men some easy road to success—but there is none. You may think you see someone traveling it, but if it is easy it is not permanent. It is only one of those rises which makes the fall the harder. Success cannot be reached without character and character grows as your muscles grow—through exercise. Honesty and dependability are absolutely essential to any permanent success.

"The chief cause of failure is the fact that few young men set out for a definite goal. Life seems sort of a joy ride. Religion and self-discipline are important. I do not mean religion in the technical observance of the precise methods of worship laid down by any specific church. I mean religion in a belief in an overruling power for good, and in the rightness of being honest and kind and considerate of others. Unless a man has that kind of religion in him, he will not be a success even though he accumulate a vast fortune."

This was said by Clyde L. Chamblin, California Electrical Construction Co., when he was president of the State Electrical Contractors Assn., at Santa Cruz in 1934. He repeated it to an annual meeting of the bid depository members in San Francisco Bay area Feb. 14, 1956.

TRAVEL PAY—The unsemantic gimmicks by which to get more pay, even on an already high scale—"travel expense" and "travel time" just to show up on the job—were ruled unconstitutional according to the IBEW constitution by its new president Gordan Freeman, in a directive to all locals.

He told them no IO approval would be given any agreements violating the IBEW's "man the job" policy.

As may be imagined, this threw business managers and executive boards of locals into a tizzy which may become a political issue at the next union convention.

Internal revenue has been eying these bonuses, hungry to take its cut by withholding. Nobody else gets exempt commuting expense, it says. Considers "travel" just so much more pay—which it is.

-EW-

A TEAM NOW—Last year National Electrical Contractors Assn., pretty much alone, fought through the Senate and into the House S-1644, the federal Construction Contracts Act. This year it has a team with it consisting of the Council of Mechanical Specialty Contracting Industries for extra support of the bill.

On the team are the Master Plumbers Assn., Sheet Metal Contractors National Assn. and NECA.

Hearings on S-1644 before the House judiciary committee started again in February.

Teamed against the bill are the AGC, Army Engineers and other government agencies who love to shop and peddle bids.

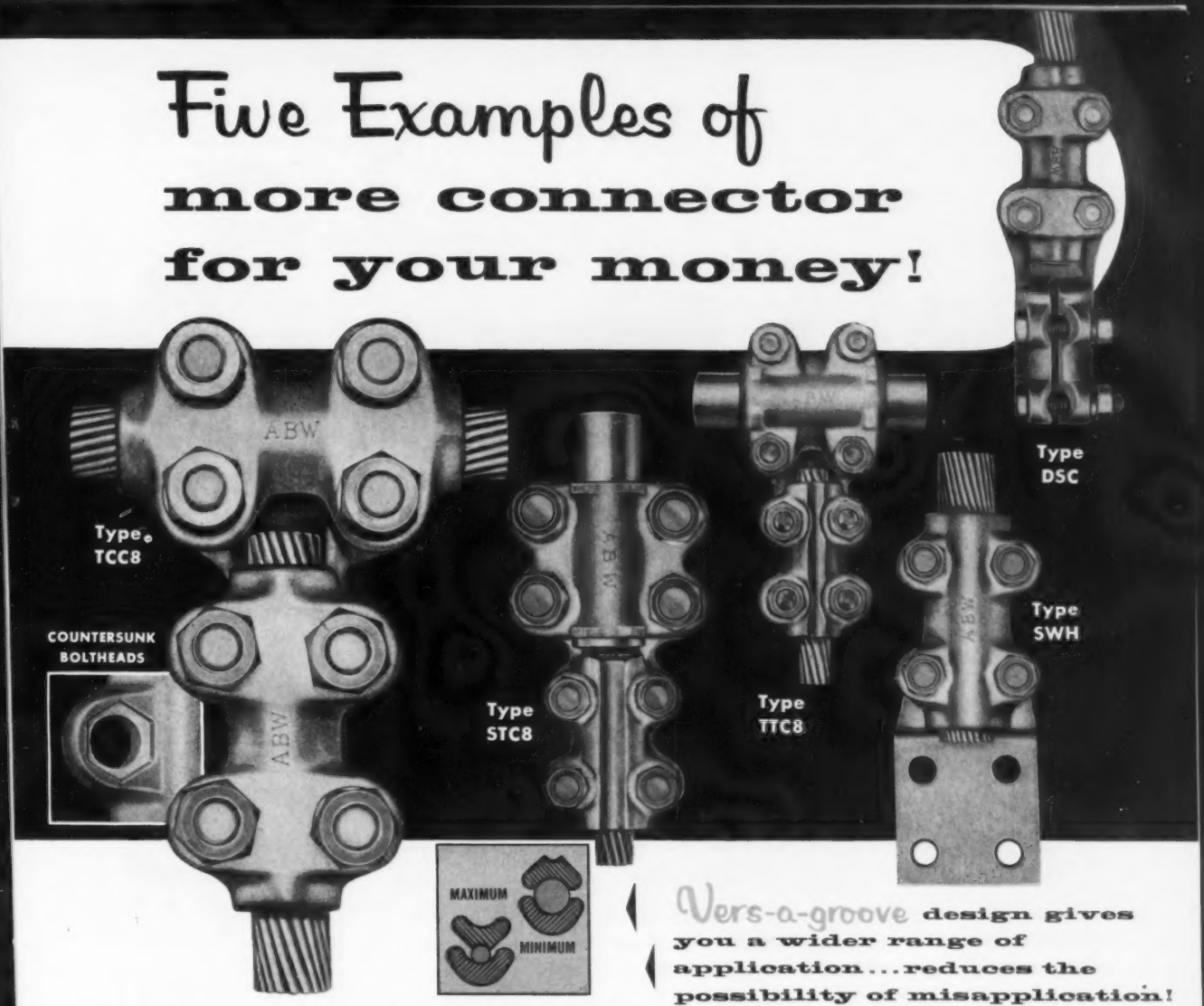
-EW-

OPPORTUNITY TO SEE, test, and ask questions about the new things in electrical equipment and supplies will be provided to selected industry key personnel at the EMEA Electrical Industry Show at Shrine Exposition Hall in Los Angeles, April 5-7. The show is for the "man who writes the specs," the installer and operator.

-EW-

MAKE RESERVATIONS NOW FOR—IES Regional conferences at San Francisco April 11-13, Spokane April 19-21 and Salt Lake City April 26-28; Engineering and Operating Section, NWEL&PA at Vancouver B. C., April 11-13; Administrative Services Section, PCEA, at Pasadena April 17-18; San Diego Spring Fair April 24-29; and RMEL Spring Conference, Denver, April 29-May 1.

Five Examples of more connector for your money!



Vers-a-groove design gives you a wider range of application... reduces the possibility of misapplication!

The 9 *stand-out features* of these Anderson Substation Connectors cannot be duplicated by any other connector line available. Look over these features carefully... *several manufacturers may claim some of them, but no connector line has them all!*

1. Two complete pairs of clamping bolts on both main and tap provide *extra insurance* against connector failure. *Most other designs have only six bolts.*
2. Higher clamping pressures with greater contact lengths *than in other standard connectors.*
3. Completely independent (3-piece) clamping on main and tap. Connection can be removed on one side without disturbing contacts on the other. *Most other connectors are two-piece.*
4. Conductor range practically eliminates mis-application and resulting connector "burn-downs". *Limited or no range of other connectors invite mis-application trouble.*
5. Wider conductor ranges permit considerable reduction in overall number of connectors which must be carried in inventory. *Two and three times greater inventory is required with other connectors.*
6. More connector for the money! More metal... 8 bolts instead of the ordinary 6 bolts!
7. One of the greatest advantages of these Anderson Vers-a-groove Tee Connectors is *ease of installation.* The 3-piece design, with independent clamping on main and tap, means that tap conductors may be bolted in on the ground and passed up to install over the bus runs. *Ordinary 6-bolt, 2-piece connectors much more cumbersome and difficult to handle.*
8. Cast surfaces which are inherently rough and tough mean positive electrical contacts. This feature plus the greater clamping strength of these connectors is a *distinct advantage in overall efficiency.*
9. The design of these connectors, by Anderson, has proved itself over more than 27 years of service under all conditions in all parts of the country. *Once used... tried and proved... no customer has ever switched back to an ordinary connector.*

For more complete information, including engineering and design data, performance characteristics and other particulars, consult your nearest Anderson Representative, or write to our home office.

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES
for SUBSTATION • TRANSMISSION • DISTRIBUTION

ANDERSON BRASS WORKS, INC.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

Pengo Tension Wire stringer being used by the Bechtel Corporation stringing 1,033,500 CM ACSR Curlew, Calol-filled Cable for the Southern California Edison Co., Los Angeles, California.

The latest method of stringing conductors

- ***Safest, most economical for transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits... by far the safest, too!***

Operation of the PENGO Tension Wire Stringer is almost unbelievably smooth. Because the tensioning is done on the Neoprene-Lined Bullwheels rather than on reels, conductor damage from the reels has been eliminated entirely. Due to the Neoprene lining of the Bullwheels, it is possible to use a full range of wire sizes to maximum groove capacity, which, in the case of the Model 6000-WS shown in picture, is Pheasant or 1⅜" diameter.

SMOOTH, POSITIVE CONTROL OF CONDUCTOR TENSION can be maintained at all times regardless of model or size of PENGO Tension Wire Stringer used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

In addition to the model shown in the picture, all series are available in low-slung trailer mounts for mountain work with separate easy-loading reel trailers.

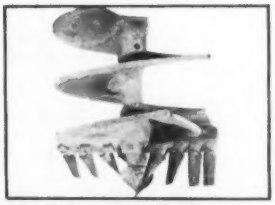
List your requirements and send for descriptive literature and prices.

PETERSEN ENGINEERING CO.
Santa Clara, California Dept. 3
Please send me more information on the new Pengo Tension Wire Stringer.
Name_____
Firm_____
Address_____
City_____ State_____

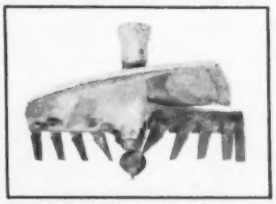
Made by the makers of the World-Famous
PENGO EARTH AUGERS

PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

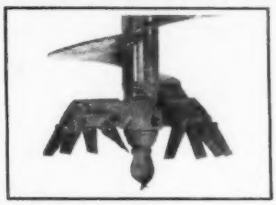
Other PENGO Products include:



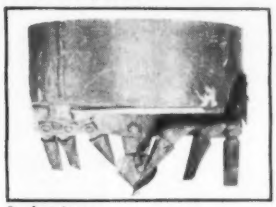
24 inch Heavy Duty Flight Auger



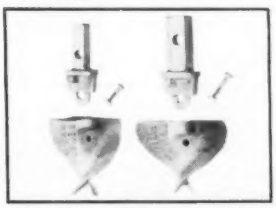
Double-Helix Heavy Duty Auger



Offset Boring Head

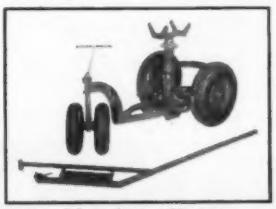


Bucket Auger



Screw Bit for Small Diameter Holes

Pulling Eye



Pole and Transformer Chariot

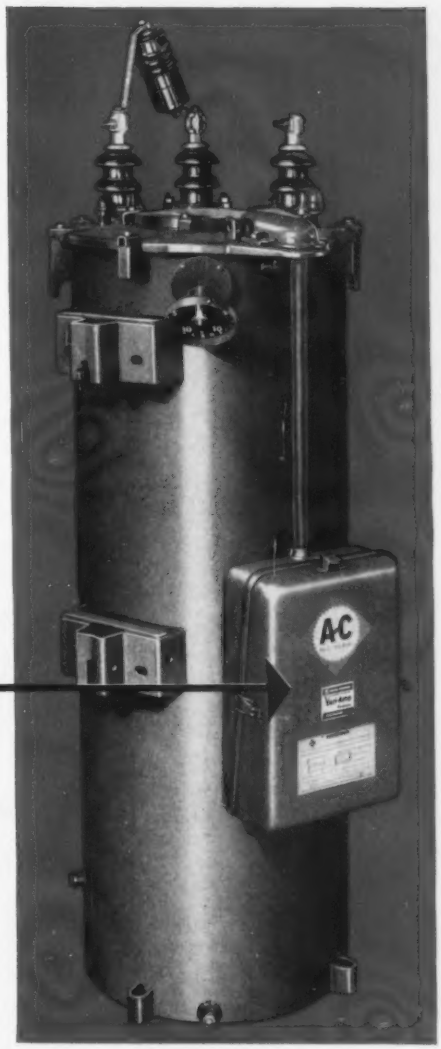
Get the Regulator you can Tailor To Your System Needs

Vari-Amp feature has built-in provisions for system needs

Now you can tailor a voltage regulator to your system's exact requirements—no need to accept ±10% regulation if your system can operate more profitably at a different range. The *Vari-Amp* feature on Allis-Chalmers voltage regulators provides *five* current ratings — 25 regulating combinations.

You can even utilize unequal ranges of regulation. Here's how it might work on a distribution regulator: set a unit for 6¼% range in the raise direction, providing 135% current capacity, and for 10% in the lower direction, at 100% of current capacity.

In addition to providing for many variations to suit many different systems, the *Vari-Amp* feature gives you more for your regulation dollar by permitting increasing capacity in five steps. On a distribution regulator, for example, you can get 160% of current capacity by reducing the range of regulation to ±5%.



25 REGULATING COMBINATIONS

This regulator equipped with

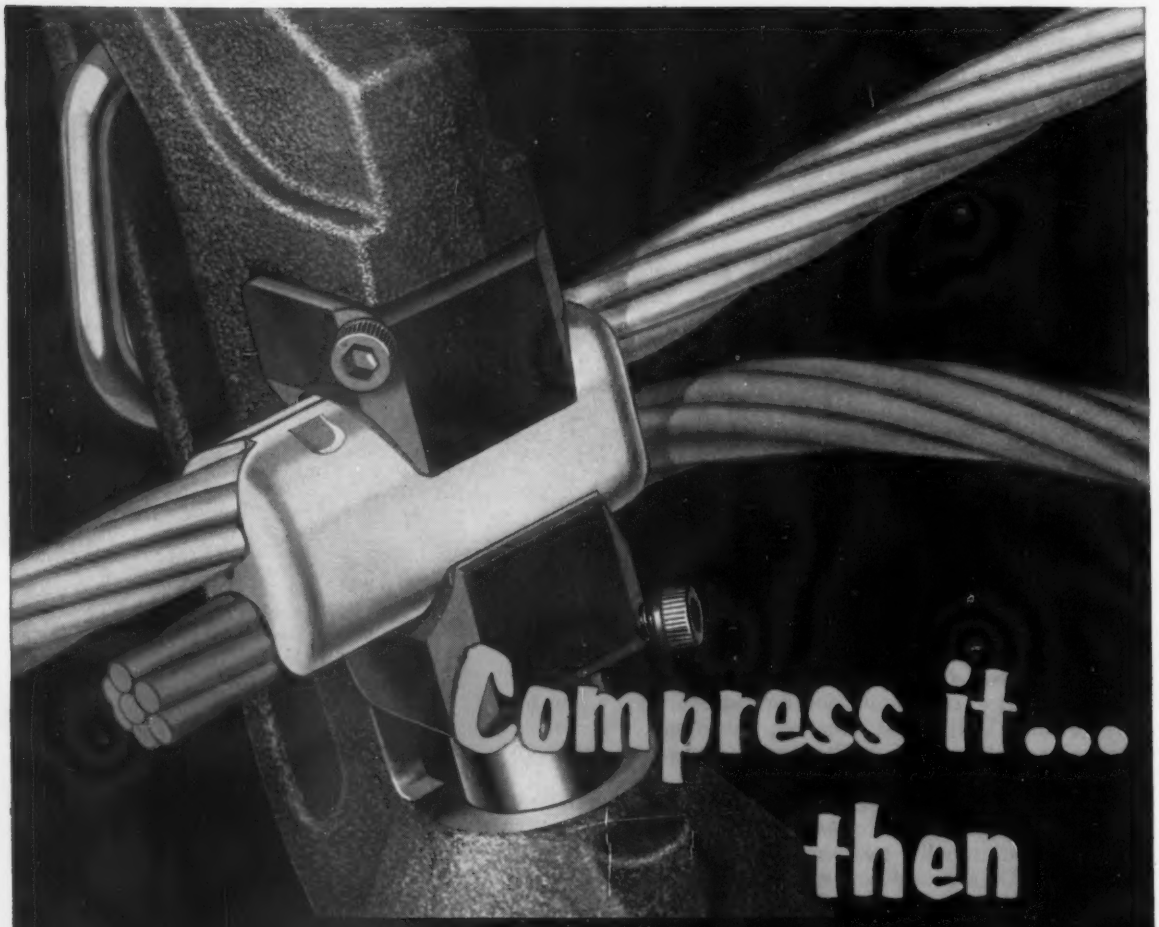
Vari-Amp Feature

ALLIS-CHALMERS

Get the complete story on the unusual opportunity for matching a regulator to your needs and getting extra capacity with the *Vari-Amp* feature. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4900

ALLIS-CHALMERS



Compress it... then forget it!

KEARNEY SQUEEZON CONNECTORS

Assure Long-Lasting, High-Conductivity Joints

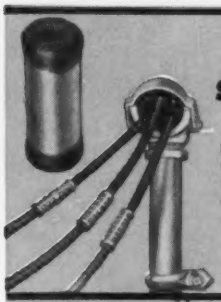
This SQUEEZON makes tight contact with about *100% more conductor surface.* Notice how each conductor fits into its own groove . . . how it is gripped around its entire circumference. Not only does this assure maximum conductivity . . . it also prevents any possibility of strand-cutting.

The metal between the two grooves forms KEARNEY'S famous "built-in spacer." It provides a metallic barrier necessary to prevent and withstand electrolytic action.

Trouble is prevented before it can start. Here is a compression connector that really "connects 'em for keeps!"

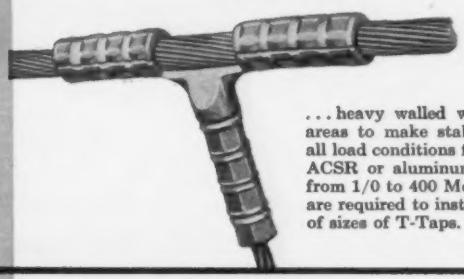
JAMES R. KEARNEY CORPORATION · 4224-42 CLAYTON AVE., ST. LOUIS 10, MO. · *Canadian Plant:* GUELPH, ONTARIO

Types to meet every construction need:



SERV-ENS

...service entrance sleeves for fast, neat and dependable service loop connections...for all combinations of ACSR, aluminum and copper conductors.

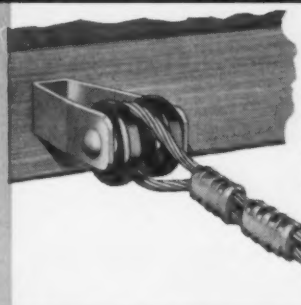


T-TAPS

...heavy walled with extended contact areas to make stable connections under all load conditions for any combination of ACSR or aluminum and copper in sizes from 1/0 to 400 Mcm. Only two die sizes are required to install the complete range of sizes of T-Taps.

TERMINAL ADAPTERS

... eliminate problems in connecting aluminum conductors to bronze or copper terminals of equipment. The aluminum sleeve is factory bonded to a length of soft copper wire... plastic covered for greater protection.



DEAD ENDS

...standard aluminum or copper Squeezon connectors make excellent high strength, low cost dead ends at either the pole or house end of secondary lines and service drops. They are easy to install and make a much neater appearing job than other methods. Depending on the holding strength desired, from one to three Squeezons may be used. Three Squeezons in series will, in general, develop the full rated strength of copper or ACSR.

L-TAPS

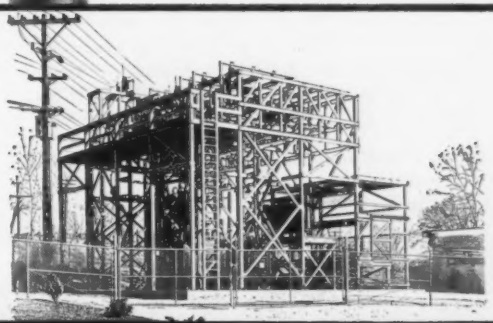
...recommended for safely connecting copper to aluminum—either line side or tap side—in locations where atmospheric contaminants will physically bridge the spacers of Squeezon connectors. The long heavy walled run section securely grips the line wire. The bore for the tap wire contains Kearnalene and is capped.

GROUND ROD SQUEEZONS

...improve circuit safety by eliminating open grounds and ground wire burn-offs caused by loose clamps. Squeezons have no screws or bolts to loosen. The dies form the fitting so that there is constant pressure on wire and rod, placing all transfer surfaces in permanent low resistance contact—safe for buried installations. The fittings are made of pure copper for highest conductivity, and forged for maximum strength.

CONNECTORS FIELD TESTED

Here at KEARNEY'S 445,000 KVA Substation Laboratory all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are actual, proved performance ratings ... not just theoretical calculations. You can be sure they will do the job they are supposed to do... with a generous margin of safety!



312W

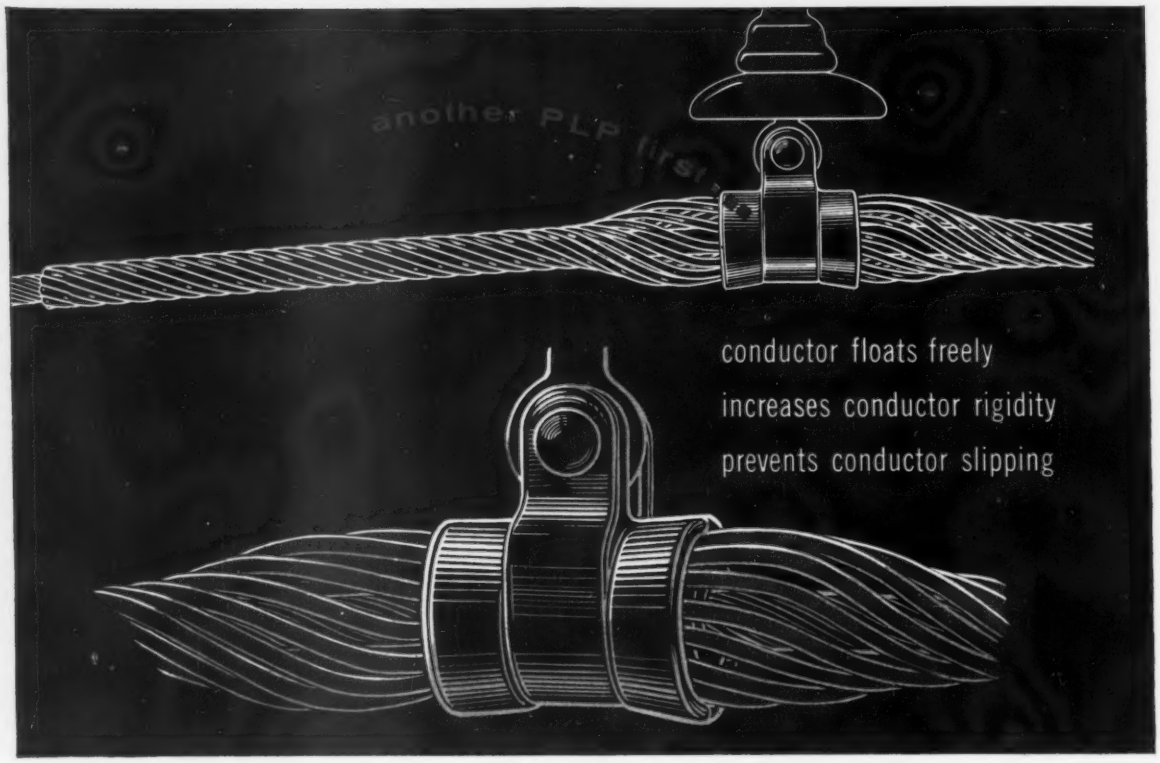
for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

JAMES R. KEARNEY CORPORATION ST. LOUIS MO. GUELPH, ONT.

The Mark of Quality

KEARNEY PRODUCTS

MAYDWELL & HARTZELL, INCORPORATED • WEST COAST DISTRIBUTORS • Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix



an entirely new concept in suspension design

After five years of intensive laboratory research and field experience, Preformed Line Products Company announces the ARMOR-GRIP SUSPENSION. This is not just a modification of the conventional clamp—in fact, in a sense it is not a "clamp" at all. The ARMOR-GRIP SUSPENSION is a "floating suspension"—the conductor is cradled in neoprene and firmly gripped only by the custom-designed Preformed Armor Rods which distribute their pressure over a relatively large area. An ingenious relation between rods and housing prevents the suspension assembly from slipping longitudinally. The expanded configuration of the PLP rods also adds rigidity to the conductor while slight vertical resilience of the conductor mounting eliminates a steep stress gradient.

THE ARMOR-GRIP SUSPENSION ELIMINATES CONCENTRATED CLAMPING STRESSES.

In severe accelerated vibration tests, conductor mounted in the PLP ARMOR-GRIP SUSPENSION outlasts conventional clamp assemblies many times—in fact, no conductor failures have ever occurred under the ARMOR-GRIP SUSPENSIONS in these tests. Thousands of ARMOR-GRIP SUSPENSIONS have been installed during the past four years—with NO reported case of unsatisfactory performance.

Yet with all these functional advantages, the ARMOR-GRIP SUSPENSION is very easy to install. Simplicity of design has eliminated many parts—there are less than one-half the number contained in a conventional clamp assembly. Only one nut to tighten.

The ARMOR-GRIP is immediately available in conductor sizes in the ranges of 336,400 cm, 477,000 cm, 795,000 cm, 954,000 cm ACSR and All-Aluminum. Other sizes will soon be available and can be produced on request.

Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

PREFORMED LINE PRODUCTS COMPANY
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
TELEPHONE: CLEVELAND EXPRESS 1-3571

THIS IS THE LON C. HILL power station, newest in the CP&L system. It represents latest thinking in station design.

Central Power and Light expands Texas system with G-E equipped Lon C. Hill steam station

Meeting the growth of Texas' industry meant new generating capacity so Central Power and Light scheduled a new station, the Lon C. Hill plant. Now in full-time operation, the new station adds 66,000 kw of electric power.

Early in planning, CP&L and Sargent & Lundy Engineers selected General Electric apparatus. Working closely with utility and S&L engineers, a G-E power plant team assigned to the job helped assure that every phase of the Lon C. Hill plant was carefully coordinated.

This cooperation produced minimum delays in the exchange of information on equipment and was an important factor in assuring on-schedule start-up.

GENERAL ELECTRIC

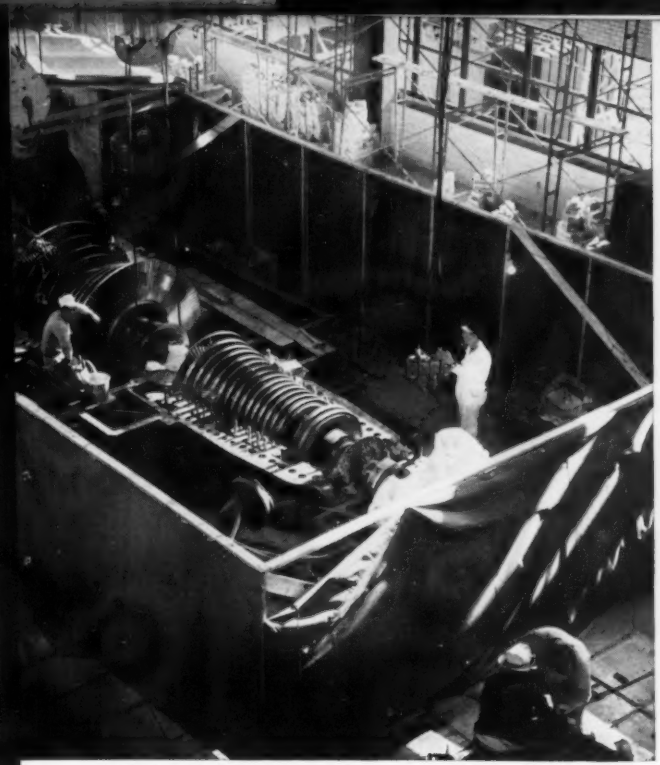
For More Data See Next Page ▶

THOROUGH PLANNING from outset of Lon C. Hill plant simplified apparatus procurement, meant faster design, manufacture, delivery, and installation. In conference above, G.E.'s W. J. Milkins, C. H. Linhoff, W. M. Bell, and A. L. Thayer discuss preliminary designs which helped Sargent & Lundy prepare detailed product specifications.

G-E planning, teamwork simplify ordering

PRELIMINARY SKETCHES, prepared by the G-E power plant team, get final review in meeting of G.E.'s R. M. Eichner and Mark Lovelady (seated), Central Power and Light's Vice President and Chief Engineer.

◀ **HIGHLIGHT OF DEDICATION** ceremonies was congratulations extended by Texas' Governor Allan Shivers to CP&L President Lon C. Hill for farsighted thinking and action.



EARLY INSTALLATION of turbine rotor for 66,000-kw G-E steam turbine-generator was made possible by efficient planning, early preparation of design specifications.

OVER-ALL COORDINATION of ordering meant that this low-voltage drawout switchgear, with magnetic air circuit breakers, was ready for installation at the proper time.

apparatus for new 66,000-kw CP&L plant

Thorough planning in early stages, single source of supply saved valuable time for CP&L, Sargent & Lundy engineers.

From earliest planning for Lon C. Hill, G-E engineers contributed important assistance to help speed equipment design and construction. The G-E application engineer, consulting with G-E product specialists, provided preliminary information on electrical equipment which helped S&L prepare detailed apparatus specifications.

As the station progressed, the value of having one electrical apparatus supplier to coordinate equipment design, manufacture, delivery, and installation became clear. S&L and CP&L engineers were freed of piecemeal expediting, could concentrate on the power plant's more important phases.

Such teamwork, combining utility, consultant, and the G-E team of sales engineers, product specialists, application engineers and service engineers, can save you time, money, and man-hours.

Here's what it can do:

Simplify ordering of equipment purchased either directly or through your consulting engineers, or through a machinery manufacturer.

Conserve engineering time by assisting with electrical equipment details, thereby freeing you and your consulting engineers for other urgent problems.

Integrate equipment design with consultant's plant design to assure the maximum flexibility and effectiveness of operation.

Speed construction by scheduling the arrival and disposition of equipment for maximum installation efficiency and on-time start-up.

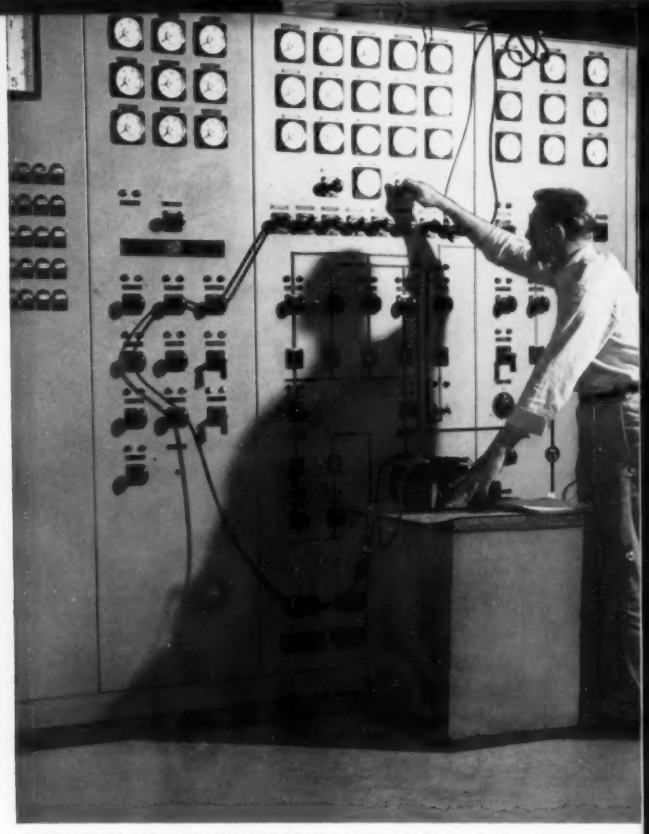
Assist in training operators to better understand the full operating capabilities of the equipment.

For details, contact your General Electric Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 302-7

MORE POWER TO AMERICA

GENERAL ELECTRIC

TRAINING OF YOUR OPERATORS, essential to the best performance of your equipment, is one of many functions of the G-E service engineer operating under G-E Power Plant Services.



CHECK-OUT OF ALL APPARATUS during initial start-up —and after—is your assurance of minimum unscheduled outages—your protection against costly shutdowns.

Another "Follow-through" of G-E Power Plant Services . . .

G-E service engineering helps keep plant at full-rated capacity after start-up

Successful completion of a power station goes far beyond initial start-up. When General Electric Power Plant Services are fully utilized on your job, station operators will be thoroughly trained to handle your equipment. Also, performance of equipment is carefully checked during initial operation. And G-E maintenance specialists outline a detailed apparatus up-keep program to minimize unscheduled outages and costly shutdowns.

Service engineering is just one of many G-E Power Plant Services on your job when you or your consultant specifies G-E equipment. You can take advantage of all these G-E services:

Application engineering helps assure all electrical equipment is coordinated in design and operation to best suit the requirements of your plant.

Product development engineering means equipment design which reflects both field experience and laboratory achievements.

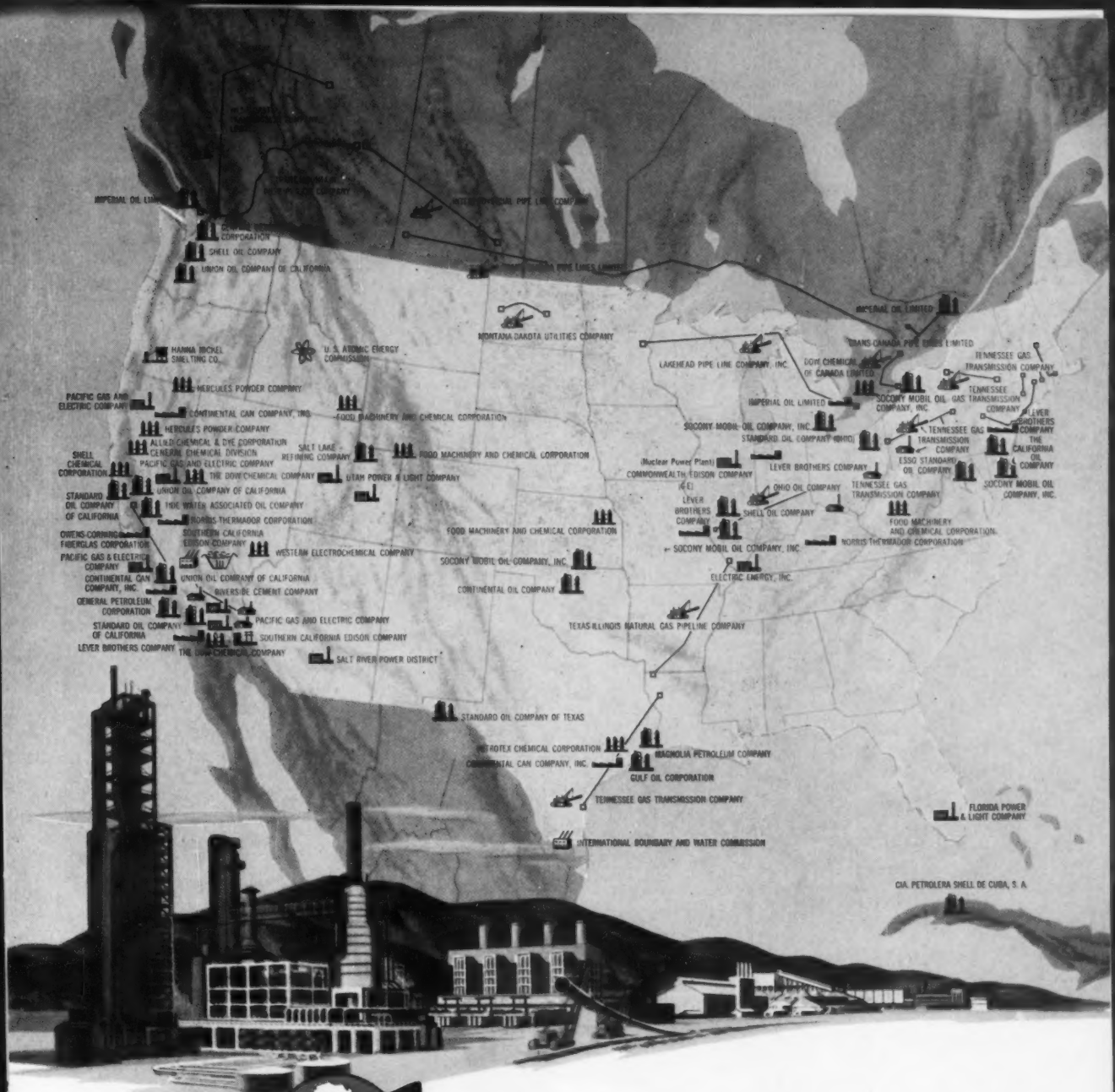
Installation supervision means competent direction of installation, planned start-up, and training of operators to help assure proper operation of equipment.

Product Services extend factory support to field service engineering, thus assuring the application of full G-E engineering and manufacturing facilities on its supervised installations and maintenance programs.

Power Plant coordination helps assure proper selection, design, manufacture, delivery of your equipment without costly delays at installation time.

MORE POWER TO AMERICA

GENERAL ELECTRIC


IMPERIAL OIL LIMITED
SHELL OIL COMPANY
UNION OIL COMPANY OF CALIFORNIA
MONTANA-DAKOTA UTILITIES COMPANY
HANNA NICKEL SMELTING CO.
U. S. ATOMIC ENERGY COMMISSION
LAKEHEAD PIPE LINE COMPANY, INC.
DOW CHEMICAL OF CANADA LIMITED
TRANS CANADA PIPE LINES LIMITED
TENNESSEE GAS TRANSMISSION COMPANY
SOCONY MOBIL OIL COMPANY, INC.
STANDARD OIL COMPANY (OHIO)
LEVER BROTHERS COMPANY
ESSO STANDARD OIL COMPANY
THE CALIFORNIA OIL COMPANY
PACIFIC GAS AND ELECTRIC COMPANY
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CONTINENTAL CAN COMPANY, INC.
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GENERAL CHEMICAL DIVISION
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THE DOW CHEMICAL COMPANY
UTAH POWER & LIGHT COMPANY
(Nuclear Power Plant)
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FOOD MACHINERY AND CHEMICAL CORPORATION
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CIA. PETROLERA SHELL DE CUBA, S. A.

BECHTEL

Among Major Projects...

BUILDERS FOR INDUSTRY

In industry's service Bechtel jobsites cover the map from British Columbia to Cuba. Other projects are located in Hawaii, South America, England, Italy, the Middle East, Korea and the Philippine Islands.

Engineering and construction experience accumulated in many parts of the world enables Bechtel to move into any area—foreign or domestic—and complete assignments with speed and economy. "Ahead of schedule, under budget" is an objective consistently met in practice.

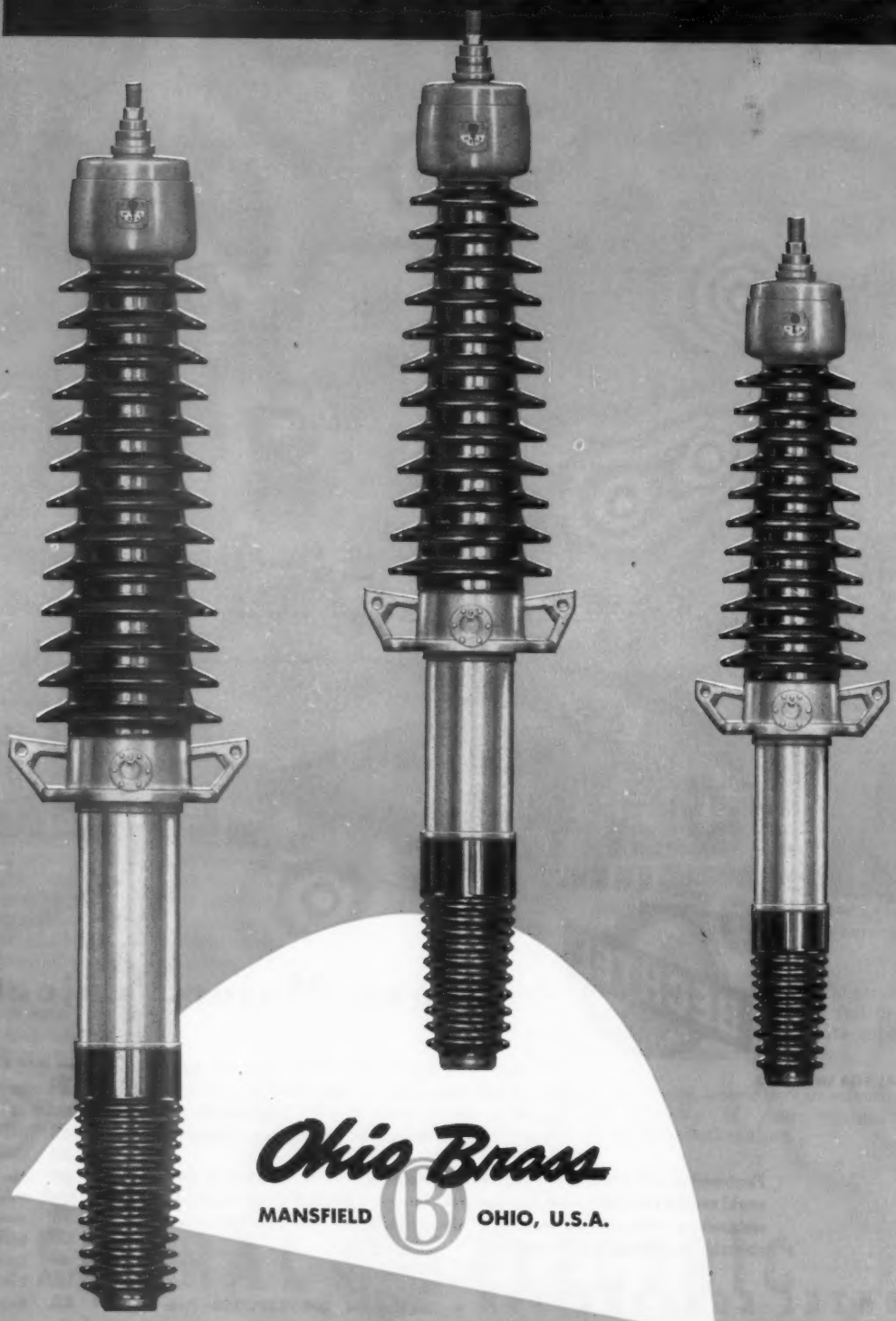
MAP LEGEND

- Oil Refinery
- Steam Power Plant
- Hydro-Electric Power Plant
- Chemical Plant
- Pipe Line
- Manufacturing Plant
- Atomic Energy Facility
- Smelter
- Compressor Station
- Dam
- Electrical Distribution

BECHTEL CORPORATION • *Los Angeles* **SAN FRANCISCO** *New York*

CANADIAN BECHTEL LIMITED • *Toronto*

Now...All the Way



Ohio Brass

MANSFIELD OHIO, U.S.A.

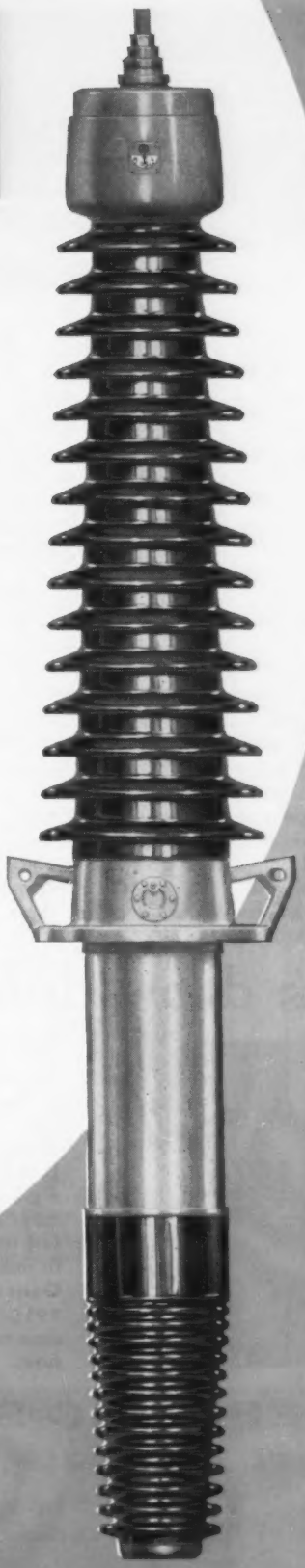
to 230 kv

With New Small-Diameter O-B Bushings

O-B has now completed its range of small-diameter, lightweight apparatus bushings to include 230-kv operating voltage. A few quick facts about these new bushings are --

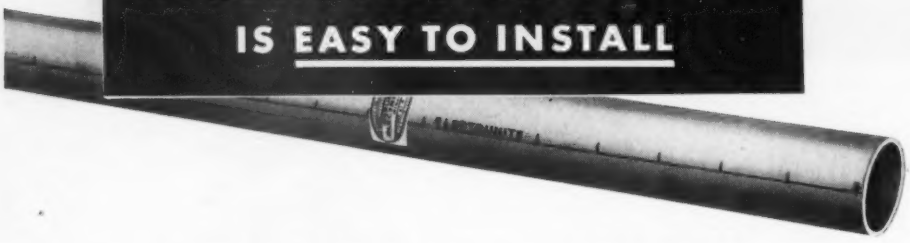
1. In this higher range (69 to 230 kv), the insulating core is surrounded with oil from end to end.
2. This core utilizes full condenser construction, comprised of multiple layers of foil and paper.
3. O-B's long-established principle of spring compression assembly, combined with improved gasketing practices, assures the vital function of permanently tight sealing.
4. In the 115 to 230-kv range, all bushings are equipped with oil level gauges and capacitance taps.
5. National Standards for these voltages have not yet been formulated, but the present O-B design is fully in line with up-to-date trends.
6. These new models extend upward in rating from the present ASA Standard series covering 23 to 69 kv. There is now an O-B bushing available for all popular operating voltages, embodying modern dimensional requirements.

One more fact -- of prime importance. For nearly 50 years, O-B has manufactured bushings that have earned the reputation for being the best of their times. This has provided priceless experience and background when embarking on the design of the new O-B bushing -- a worthy member of an illustrious family.



4639-H

In power plants . . .
REPUBLIC ELECTRUNITE E. M. T.
IS EASY TO INSTALL



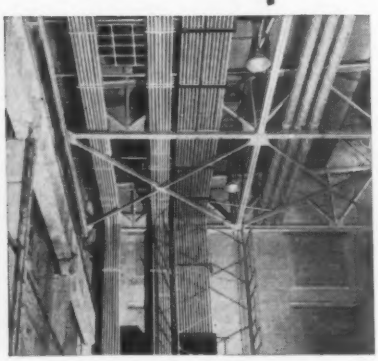
In fact, handling and fabricating Republic ELECTRUNITE® E.M.T. is so comparatively easy you're bound to save on installation costs.

ACCURATE BENDS are easy to make thanks to the exclusive Republic "Inch-Marking" feature on all popular sizes. By aligning these markings with calibrations on the Republic Bender precisely, the right degree of bend is obtained—every time. Another exclusive feature—the Guide Line—helps keep bends in the correct plane, avoiding costly "wows." And the uniform ductility of Republic's high-quality steel makes 90-degree bends possible with surface smooth and unwrinkled, inside and out.

Rain- and concrete-tight couplings and fittings are used with Republic E.M.T. There are no threads to cut, no runs to turn, every connection is a union. Lasting joints are made by strong, compression fittings. And since threading is unnecessary, the galvanized coating is unbroken—providing permanent end-to-end corrosion and circuit protection.

Republic "Inch-Marked"® Electrical Metallic Tubing has been on the job in utility installations for more than 25 years—and still going strong. For your modernizing or new building program, it will pay you to check costs and advantages. E.M.T. is produced to A.S.A. specifications C-80.3, Federal specification WW-T-806 and is approved by Underwriters Laboratories. Write for all the facts. *Send for your free copy of 76-page ELECTRUNITE bending instruction booklet.*

It's dependable, too



The Iowa-Illinois Gas and Electric Company reports *no trouble in more than 20 years of service.* In fact, Republic ELECTRUNITE E.M.T. proved to be such a good long-term investment it was again specified for a big installation in this company's Moline Generating Station in 1953. Those are the old runs to the far left in picture.

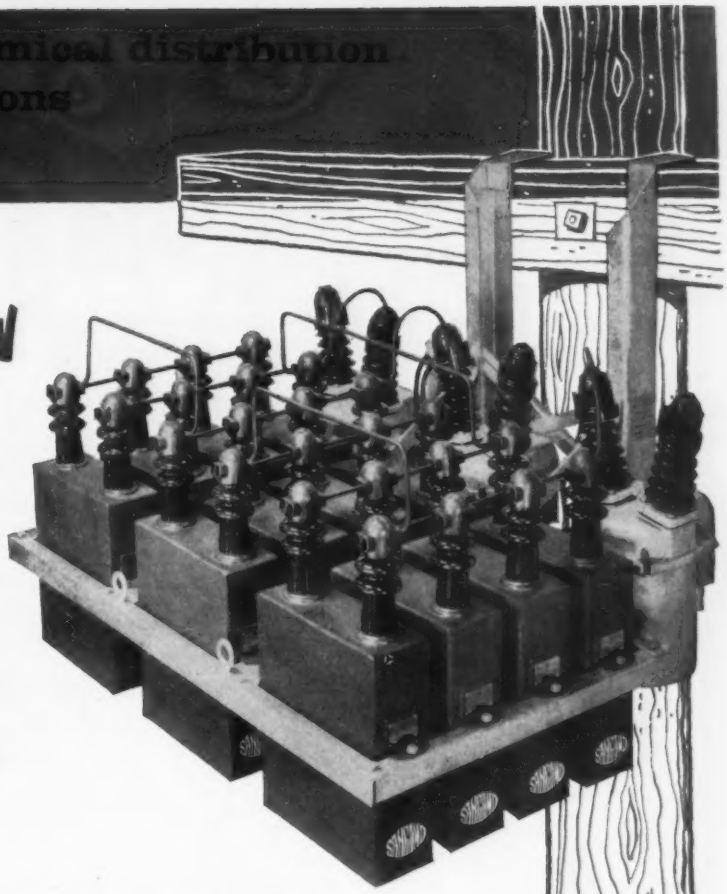
REPUBLIC STEEL
STEEL AND TUBES DIVISION

REPUBLIC STEEL

216 East 131st Street
Cleveland 8, Ohio

for quick, economical distribution circuit installations choose

Sangamo's New Auto-Var Pole-Type Capacitor Equipment



Now Sangamo's Diaclor Power Capacitors are available in factory-assembled and wired Auto Var equipment for pole-type installation. They are designed for easy installation, structural soundness, and excellent electrical performance in the improvement of power factor.

They offer all these features:

- Sangamo 25 Kvar Diaclor Power Capacitors.
- Hot dip galvanized steel rock for cross-arm mounting.
- Available with or without electrically-operated oil switches.
- Weatherproof junction box with terminal block for control wiring.
- Insulating caps on all capacitor and oil switch terminals.
- Clamp-type ground stud that accommodates #8 to #2/0 wire.
- Neoprene jacketed, #6 solid conductor connections between units.

Write for full information.

SANGAMO

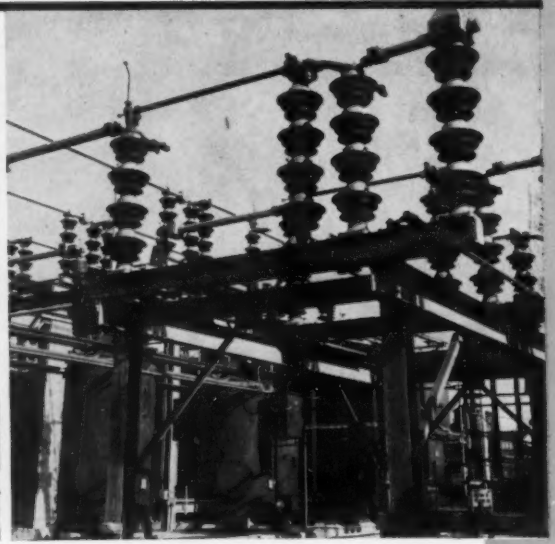
SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS

FROM SEATTLE TO NEW YORK IT'S THE TYPE wag SWITCH!

Southern States' switches being specified by more and more utilities

SEATTLE—City of Seattle, Department of Lighting, uses 44 Type WAG Switches with AMPLITACT® in its new Duwamish Substation, seen here, and 12 in its Shoreline Substation.



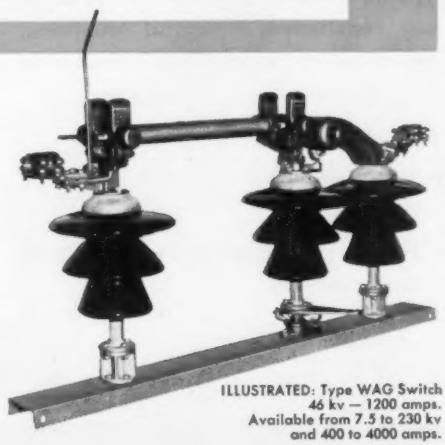
NEW YORK—Consolidated Edison Company's Astoria Generating Station uses Southern States 161 kv 1200 amp Type WAG Air Break Switches and G-WAG Grounding Switches.

Here is why growing numbers of Southern States' Type WAG Switches are being used throughout the nation:

Increasing generating capacities, with higher degrees of integration and corresponding increases in short circuit capacities, require switches that will meet these conditions.

The Type WAG carries its rated current indefinitely without excessive temperature rise and withstands high short circuits without damage. Even under the most adverse conditions, such as icing, the Type WAG can be depended upon to perform adequately.

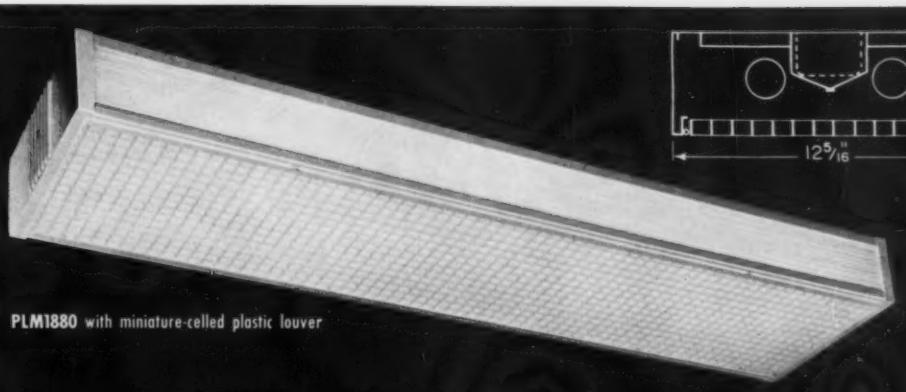
All of the features are described in Bulletin 390-R. Get a copy from your Southern States representative, or write direct, and see why it will pay you to specify and use Type WAG Switches.



ILLUSTRATED: Type WAG Switch 46 kv — 1200 amps. Available from 7.5 to 230 kv and 400 to 4000 amps.

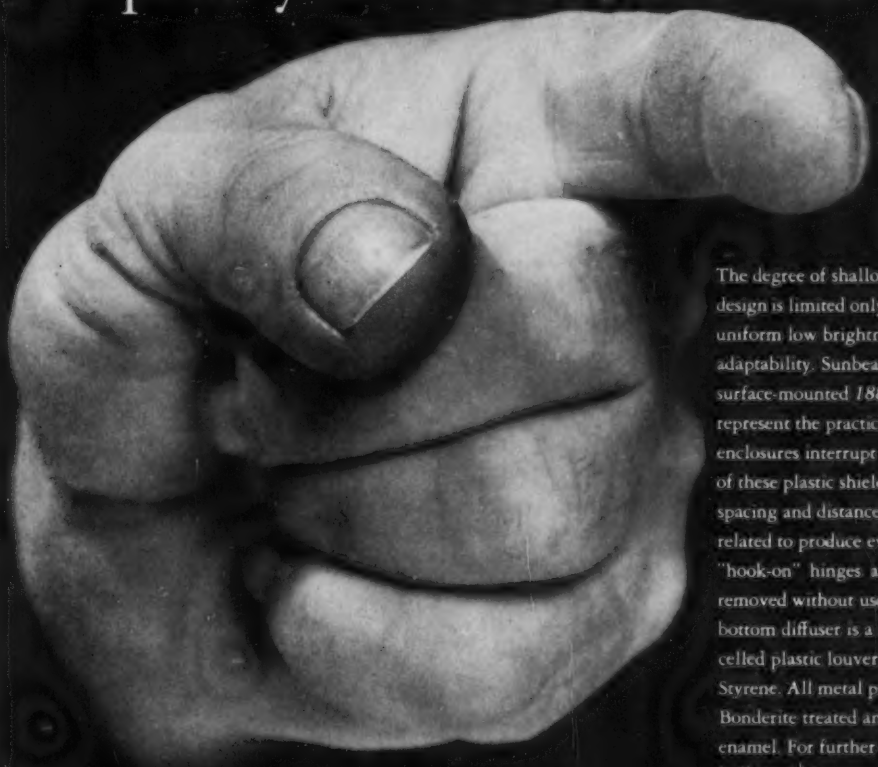
SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto



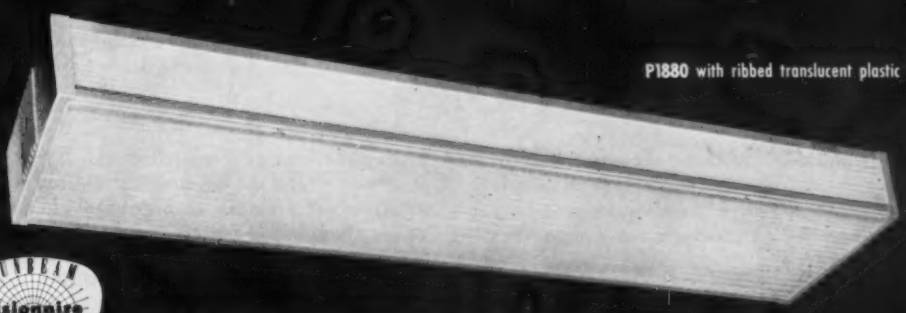
PLM1880 with miniature-celled plastic louver

a point you can't afford to miss



The degree of shallowness in lighting fixture design is limited only by how much you demand uniform low brightness and architectural adaptability. Sunbeam's new, extra-shallow surface-mounted *1880 series Visionaires* represent the practical limit. No exposed ballast enclosures interrupt the smooth appearance of these plastic shielded luminaires. The lamp spacing and distance to diffusers are exactly related to produce even brightness. Unique "hook-on" hinges allow bottom panel to be removed without use of tools. Fully framed bottom diffuser is a single-element miniature-celled plastic louver or ribbed, translucent Styrene. All metal parts are corrosion resistant Bonderite treated and finished in baked white enamel. For further details, please ask for bulletin 739.

P1880 with ribbed translucent plastic



SUNBEAM visionaire LIGHTING COMPANY
777 EAST 14th PLACE, LOS ANGELES 21, CALIFORNIA

DROP FORGING makes

See the difference Drop-Forging makes

BTC FORGED CLAMP
Fibrous grain structure of metal conforms with shape of clamp . . . making clamp stronger, tougher, and permits lightweight design.

CAST CLAMP
Metal has no fibrous structure. Lower yield and tensile strengths . . . heavier sections necessary in critical areas . . . has undesirable mass.

BTC SUSPENSION CLAMPS are recommended for application on all transmission line conductors in general use. Because they are drop-forged, they develop uniformly high strength, more than adequate for field service.

Heavy sections or reinforcing ribs . . . necessary in other materials to develop desired strength and prevent collapse or breakage of the clamp under clamping U-Bolt pressure . . . are not required in these clamps. As a result, undesirable weight is eliminated without sacrificing strength.

BTC conductor suspension clamps better

6200A SERIES
Steel Suspension Clamps. Drop-forged steel, hot-dip galvanized, suitable for all conductors.

9500 SERIES
M.P.L. (Minimum Power Loss) Aluminum Suspension Clamps. Drop-forged, heat-treated Aluminum Alloy Clamps for A.C.S.R. and All-Aluminum Conductors.

The light weight and generous longitudinal radius of the conductor seat minimize the effects of conductor vibration. The conductor is not bent over a small radius at any point. Clamping pressure is greatest at the center, gradually decreasing toward each upswept end of the keeper. Clamp and keeper ends are liberally bell mouthed and beaded to prevent conductor damage and formation of corona.

The conductor is fully supported in the BTC clamp body. There are no open pockets at U-Bolt holes to allow distortion of the conductor under clamping pressure. The clamp's superior strength insures against failure under severe loading, while its greater hardness prevents excessive wear at points in contact with the supporting pin.

The close-grained, non-porous structure of the forged clamp body effectively prevents the destructive internal seepage of corrosive elements . . . a cause of failure in some transmission line fittings produced by other processes.

You will find exactly the right clamp for your conductor in BTC's complete line of Drop-Forged Suspension Clamps. No bore size allowance for manufacturing variations is necessary due to the close dimensional fidelity of the die-forged and die-formed parts.

Specify BTC **DROP-FORGED Hi-Line Hardware**

. . . From Your Insulator Manufacturer

The BREWER-TITCHENER CORPORATION, Cortland, N. Y.

YOUNGSTOWN BUCKEYE CONDUIT

HOT GALVANIZED: High quality steel pipe is first thoroughly cleaned by pickling in acid, then immersed in a bath of molten pure zinc. After threading, a coating of tough, transparent enamel is baked on —providing double corrosion protection of zinc and enamel —inside and out.

ELECTRO GALVANIZED: After being threaded, reamed and carefully inspected, this conduit is cleaned by pickling, then uniformly coated outside with zinc. A coat of tough, elastic black enamel is then baked on the interior, providing protection as well as a smooth raceway for trouble-free wire pulling.

BLACK ENAMELED: A protection, black enamel coating is applied inside and out by dipping. When a uniform thickness of this coating has been achieved, it is then baked to form a tight, elastic, high lustre finish—guarding against cracking in bending or forming operations during installation.

ELECTRICAL METALLIC TUBING: Absolute uniformity of weight, wall thickness and concentricity, plus protective outside coating of pure zinc and baked-on elastic enamel interior, forms this modern mirror-smooth raceway. Lightweight, easy to handle, no threads to cut, bends readily and assures safe, economical, life-time electrical installations.

Proven — THROUGH THE YEARS

Yes, Youngstown Buckeye Conduit has been proven through the years by thousands of owners and by leading Electrical Contractors the world over . . . proven that it is easy to bend . . . easy to fish wires through . . . and economical due to greater corrosion resistance that means longer, trouble-free life in actual service. Youngstown Buckeye Conduit has also proven that it pays dividends through lower installation costs and greater efficiency. Add to these many features the fact that Youngstown Buckeye Conduit is manufactured "from iron ore to the finished product" by ONE integrated steel company and you know why it Is prefered by so many.

CONDUIT

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Threads Per Inch	Feet Per Bundle
½	.622	.840	.109	14	100
¾	.824	1.050	.113	14	50
1	1.049	1.315	.133	11½	50
1¼	1.380	1.660	.140	11½	30
1½	1.610	1.900	.145	11½	30
2	2.067	2.375	.154	11½	
2½	2.469	2.875	.203	8	
3	3.068	3.500	.216	8	
3½	3.548	4.000	.226	8	
4	4.026	4.500	.237	8	
5	5.047	5.563	.258	8	
6	6.065	6.625	.280	8	

Conduit furnished in 10-foot lengths, threaded both ends with one coupling.

COUPLINGS

Size	Outside Diameter (Inches)	Length (Inches)	Pieces Per Carton
½	1.063	1.562	100
¾	1.313	1.625	50
1	1.576	2.000	50
1¼	1.900	2.062	50
1½	2.200	2.062	50
2	2.750	2.125	25
2½	3.250	3.125	
3	4.000	3.250	
3½	4.625	3.375	
4	5.000	3.500	
5	6.296	3.750	
6	7.390	4.000	

ELBOWS

Size	Radius (Inches)	Offset (Inches)	Pieces Per Carton
½	4.000	6.500	50
¾	4.500	7.250	50
1	5.750	8.750	25
1¼	7.250	10.500	20
1½	8.250	11.750	15
2	9.500	13.500	10
2½	10.500	15.000	
3	13.000	18.000	
3½	15.000	20.500	
4	16.000	22.000	
5	24.000	31.000	
6	30.000	37.500	

ELECTRICAL METALLIC TUBING

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Feet Per Bundle
½	.622	.706	.042	100
¾	.824	.922	.049	100
1	1.049	1.163	.057	100
1¼	1.380	1.510	.065	50
1½	1.610	1.740	.065	50
2	2.067	2.197	.065	30

EMT furnished in 10-foot lengths, without couplings.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
GENERAL OFFICES • YOUNGSTOWN 1, OHIO • U. S. A.

BUCKEYE YOUNGSTOWN CONDUIT

Announcing
ADVANCE
BALLAST SERVICING PLAN

This ADVANCE Fluorescent Lamp Ballast Servicing Plan has been established to save time and money for electrical contractors, lighting equipment manufacturers, engineers, electric utilities, architects and users of fluorescent lighting equipment. To serve you in this program ADVANCE, the world's largest exclusive ballast manufacturer, has appointed a nationwide network of service-stocking distributors. These authorized distributors carry a complete stock of ADVANCE ballasts and will replace, WITHOUT CHARGE, any ADVANCE ballast which becomes inoperative within the two-year warranty period. Also, from this ADVANCE stock, which includes ballasts to operate all fluorescent lamps, they offer immediate replacement service for any other make ballast.

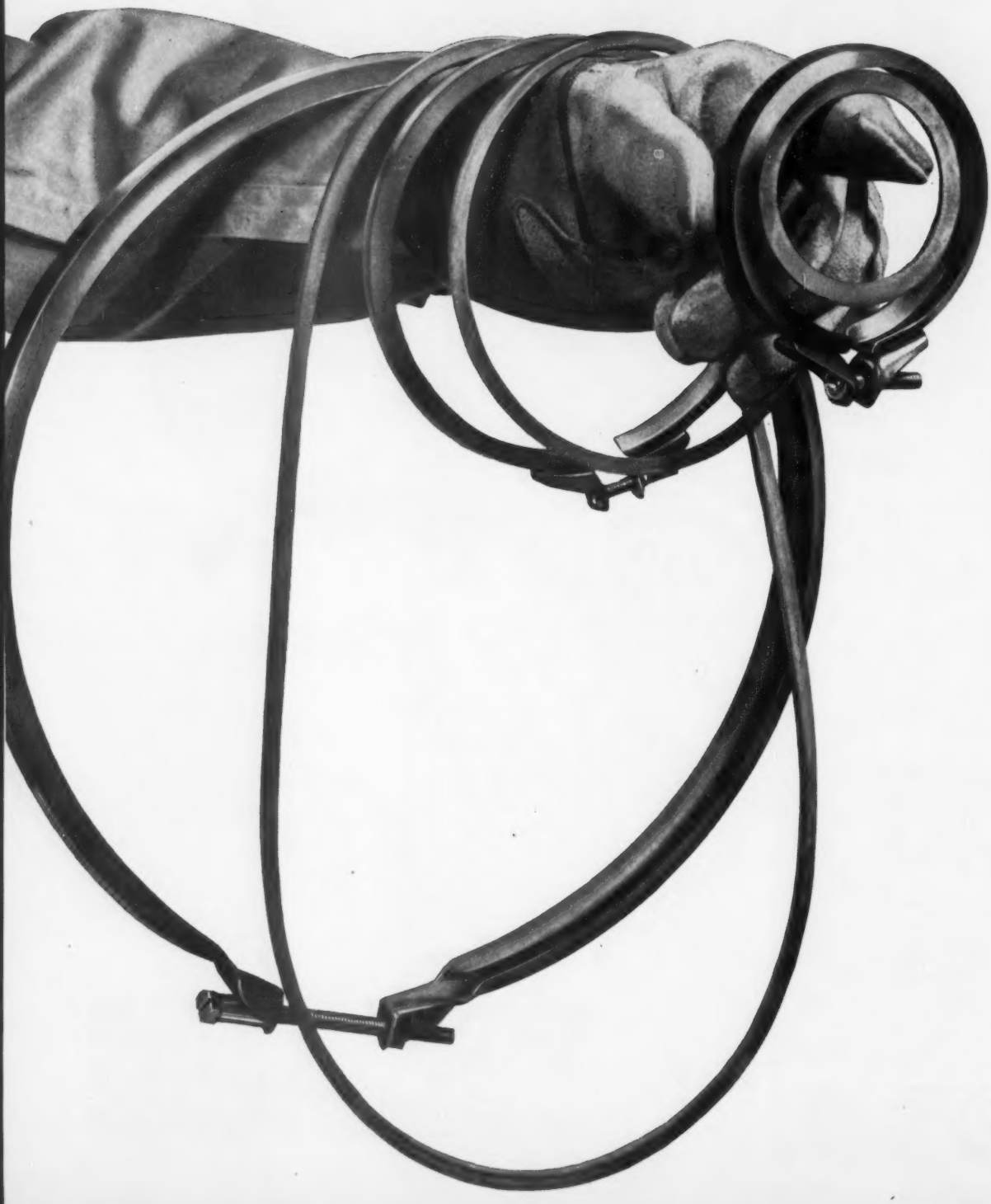
The ADVANCE label is your assurance of dependable, efficient performance at lowest cost . . . the result of years of engineering and development that have made ADVANCE fluorescent lamp ballasts "The Heart of The Lighting Industry".

The new ADVANCE Buyer's Guide, the Cross-reference Fluorescent Lamp Ballast Replacement Chart together with the brochure listing authorized ADVANCE Service-Stocking Distributors will be sent to you without cost or obligation. Write today!

ADVANCE
CBM CERTIFIED
World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts
TRANSFORMER CO.
2950 No. Western Ave. Chicago 18, Illinois

DISTRIBUTION TRANSFORMERS

THESE BRACELETS



COULD SAVE YOU...$210

Estimate your possible savings in terms of all transformers on your lines

Sometimes an ordinary transformer cover warps from uneven pressure because of careless tightening of clamps or bolts. If the cover has the usual cork or cork-and-rubber gasket, air can leak in. In one recent case-history moisture accumulated in the tank in less than a year, causing a short [circuit between tank and windings. The failure cost $210 for the service trip and replacement of the 5-kva, 2400-volt unit.

G-E cover design prevents this problem. The one-piece stainless-steel clamping band and Nitrile rubber gasket on a G-E transformer maintain a tight seal for the life of the transformer. The band is tightened with only one bolt—pressure is thus uniform around the rim. The gasket resists air and oil, and continues to exert "back" pressure against rim and cover. Similar one-piece stainless-steel bands and Nitrile gaskets are used for bushings and hand hole covers. Factory sealing is thus maintained permanently.

Gaskets and bands are easy to remove. The Nitrile gaskets, furthermore, require no cement and can be used over and over again.

Look at the other money-saving features that prove "All Transformers Are Not Alike": **Impulse testing,** for instance, saves years of transformer life. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense. **Service shops** can cut your repair and rebuilding costs.

For the complete story, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Section 431-35, Schenectady 5, N. Y.

dollar-saving features prove ATANA*

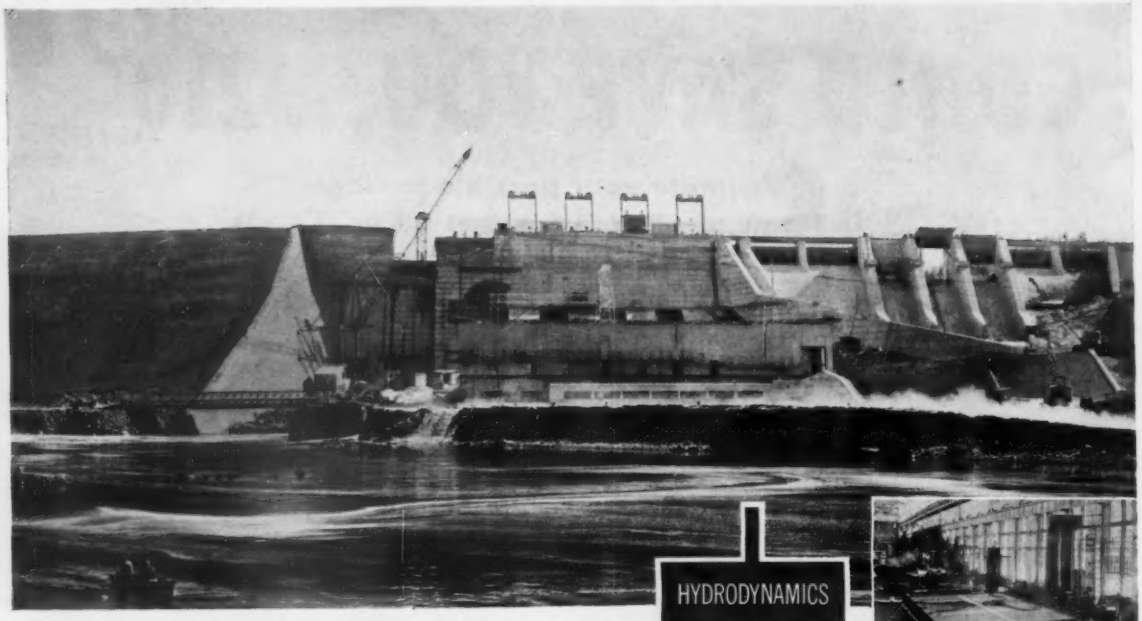
*ALL TRANSFORMERS ARE NOT ALIKE
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

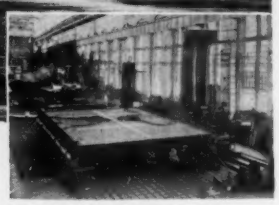
Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



Looking upstream across the tailrace area, the SMS-Fixed Wheel Intake Gate on Unit #3 can be seen being lowered into position atop the dam.



Two halves of a gate have been assembled and aligned on a 7-inch bar horizontal boring mill. SMS bores wheel axle holes in this manner to assure accurate alignment within close tolerances.

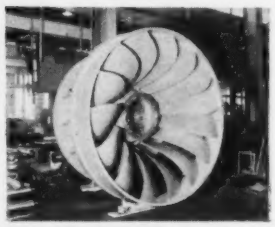
SMS-Francis Turbines At Littleton Development To

GENERATE PEAK POWER

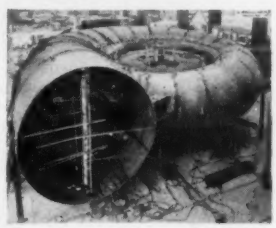
To meet rapidly increasing demands within the New England Electric System's area, Moore Station near Littleton, New Hampshire, will soon go on the line delivering peak load power. Rated at 150,000 kw, this new hydro plant is the third and last on the Fifteen Mile Falls stretch of the Connecticut River. Including the Comerford and McIndoes Stations immediately downstream, this will give a total capacity of 310,000 kw in a river fall of 367 feet at this location. Thus the largest of New England's rivers becomes one of the most highly developed streams of its size.

All three of the Fifteen Mile Falls plants are powered by SMS turbines. The four Littleton units are the vertical Francis type, each rated at 56,400 HP under a 150-foot head. SMS also provided four 18-foot x 24-foot fixed wheel intake gates for operation with an 84-foot head on the sill of the gate frame. The gates are designed for closing under full discharge and opening under balanced hydraulic conditions.

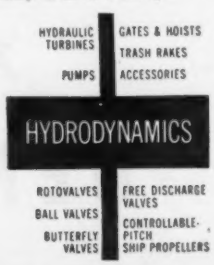
These three plants, with both SMS-Francis and Kaplan turbines as well as accessories, illustrate S. Morgan Smith's ability to handle the needs of any hydro project. Over three quarters of a century's experience in hydraulic design and manufacture stand behind SMS equipment. For full information, write S. Morgan Smith Company, York, Pennsylvania.



Unit #3's runner, completed and ready for shipment.



The 198-inch diameter riveted plate steel spiral case (with riveted cover plates) for Unit #1, taken during assembly at SMS Plant #2.

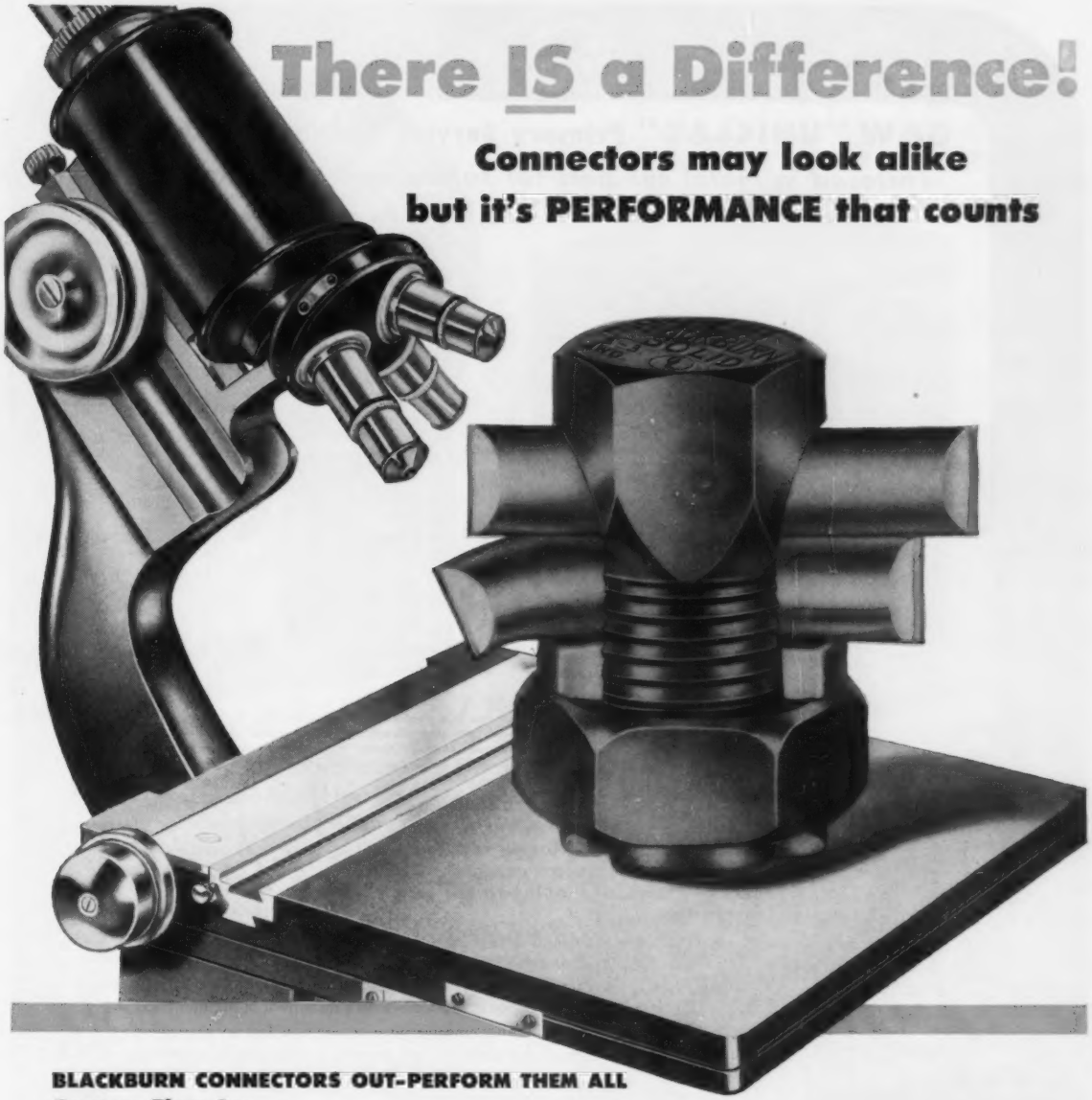


S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

There IS a Difference!

Connectors may look alike
but it's PERFORMANCE that counts



BLACKBURN CONNECTORS OUT-PERFORM THEM ALL

Because They Are...

BETTER MECHANICALLY

- Made of high strength duronze, a silicon bronze alloy stronger than structural steel.
- Machine cut threads, *CFC treated, provides more thread engagement —reduces friction and increases thread efficiency. *Chemical Friction Control.
- Rigid inspection of each production operation assures uniformly good connectors.

BETTER ELECTRICALLY

- High clamping force—the result of greater thread efficiency breaks down oxide on the conductor improving conductivity.
- Higher initial conductivity, actually greater than an equal length of conductor is maintained permanently.

REUSABLE

- Selection of proper high-strength, corrosion-resistant materials—plus precision workmanship and inspection—means Blackburn connectors may be used over and over.

AVAILABLE AT ELECTRICAL WHOLESALERS EVERYWHERE

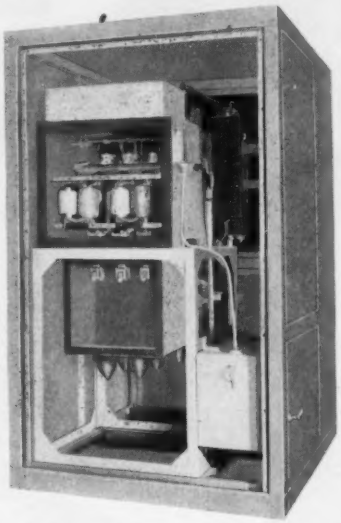
BLACKBURN *Hi-Strength* **CONNECTORS**

Distributed on the West Coast by
GENERAL ELECTRIC SUPPLY CO.

JASPER BLACKBURN CORP., 35 Madison Street, St. Louis 6, Missouri • Phone MAin 1-2821

G&W "UNICLAD" Primary Service Switch-Fuse Units

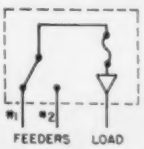
enclosed in metal cabinets for safety and appearance.



Left side panel and cover plates removed to show details of oil switch (with control transformers) and of cable terminating compartment. Also note Model "F" automatic operating mechanism. Oil switches can be furnished for full load break manual operation instead of automatic.

Right side opened to show disconnecting type power fuses and load cable pothead. The pothead can be 3 conductor as shown or 3 single conductor—or less potheads for rubber insulated cables in dry locations.

TYPE "U-SC-RAD-F" UNIT including: Feeder selector oil switch, 3 pole, 15 Kv., 400 amp. full load break; with Model "F" automatic transfer mechanism. "SC" power fuses and pothead for load connection.



G & W combination load break oil switch-fuse primary service units—in economical functional designs have been furnished for many years. They help maintain service continuity and provide load circuit protection. They have a remarkable record of trouble-free operation—with a minimum of maintenance.

The oil switches, fuses and other component parts are now factory assembled as UNICLAD metal enclosed units—which present a neat and harmonious appearance in indoor or outdoor locations. The enclosure of porcelain bushings, live lugs and connections promotes safety.

The arrangement of equipment within the UNICLAD enclosure is such that ready access is provided for termination of feeder and load cables, for maintenance of oil switches and mechanism and for replacement of fuses.

UNICLAD switch-fuse units are custom designed for practically any primary service center requirements.

Get in touch with us or our representatives for further data and prices on "Uniclad" Switch-Fuse units to meet your requirements.

G & W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois, U.S.A.

Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

D557

Bulletin H 307-156

MOLONEY ELECTRIC

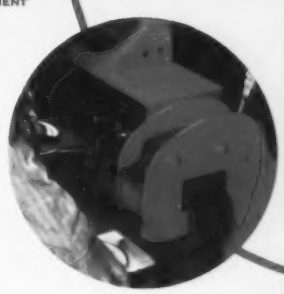
SLITTING CORE STEEL

MAKING GOOD TRANSFORMERS BETTER

Ever since the early days of commercial electricity, Moloney has been constantly on the move developing and producing better transformers. Transformers generally available during the "nineties," had high losses, poor regulation, relatively short thermal life and extreme susceptibility to damage from lightning. Moloney's modern HyperCore Distribution Transformers feature greatly improved losses, excellent regulation, high overload capacity and unmatched resistance to lightning surges.

Today's Moloney HyperCore Transformers have wound cores made from grain-oriented, cold-rolled, silicon steel, making possible transformers of smaller physical size, lighter weight and improved loss characteristics. Full advantage of these qualities cannot be realized on production runs of transformers without close control over processing. Care in annealing cores . . . checking the nitrogen atmosphere and controlling the heating and cooling cycle in both time and temperature . . . is of extreme importance. Likewise, care in impregnating, baking and cutting the cores is necessary to maintain top quality. Moloney's quality control engineers constantly check these processes.

CORE WINDING DEPARTMENT



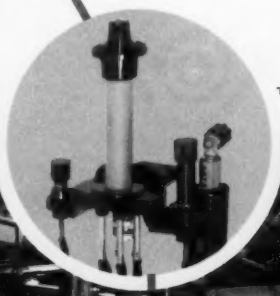
CORE TESTING

MOLONEY ELECTRIC COMPANY, ST. LOUIS 20, MISSOURI

Unlike windings on the "old timers," today's transformer windings are much more than a "bunch of turns" designed to give the proper transformation ratio. Instead they represent a scientific application of insulating materials and cooling ducts designed to provide high resistance to lightning surges, and safe operating temperatures during heavy short-time overloads. These modern windings are stronger mechanically and can better withstand the forces acting under short circuit conditions. Constant inspection and tests keep tab on these qualities . . . research keeps improving them.

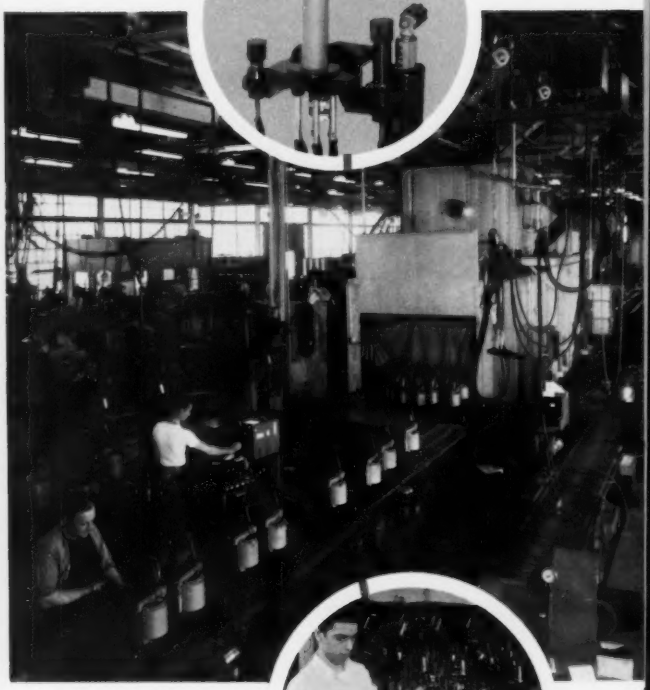
ASSEMBLING
CORE-AND-COIL UNITS

COIL TESTING



TAP CHANGER

COIL WINDING DEPARTMENT



CORE-AND-COIL ASSEMBLY BAY

WINDING COILS

TESTING
CORE-AND-COIL UNITS

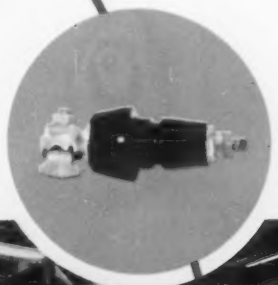
Moloney HyperCore Distribution Transformers get quite a going over before they are crated for shipment. They are tested at various stages of production, as well as at the end of the production line. Coils are tested in the winding department and cores are tested in their department. The core-and-coil assemblies are tested before they are installed in their tanks and again after the transformers are completely assembled. Tests include standard commercial production tests, impulse, audio sound level and radio influence tests.

MOLONEY ELECTRIC

MOLONEY ELECTRIC COMPANY

The ancient "tubs" frequently experienced an early demise because they were "freebreathers." Entrance of moisture and oil sludging due to oxidation took their toll. Not so with today's Moloney transformers with their completely sealed tank design. Moisture and oxygen are sealed out. Other features that research has given the modern HyperCore Transformer are . . . leak-free electronic welding of tanks . . . triple-thick base construction . . . the best in protective paints.

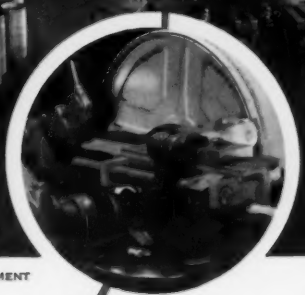
FINAL ASSEMBLY



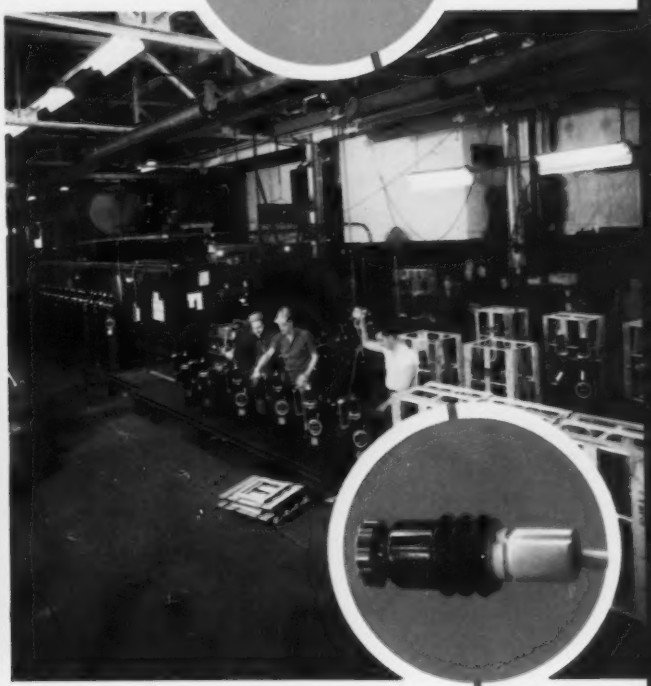
LOW VOLTAGE BUSHING

TANK PAINTING

TANK DEPARTMENT

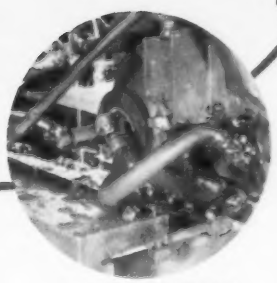


ROLLING BASE FLANGE



TESTING AND CRATING DEPARTMENT

HIGH VOLTAGE BUSHING



SEAM WELDING TANK WALL

Moisture is removed from windings by vacuum and heat treatment. Air entrained in the transformer oil, and air bubbles that may become trapped in the windings, are removed by vacuum treatment of the entire transformer after assembly. This type of careful processing assures high surge strength.

Naturally today's HyperCore Transformers are provided with many mechanical features that weren't thought of during the early days. These include . . . keyed bushings that won't turn when the terminals are tightened . . . electro-tinplated terminals permitting use of either copper or aluminum conductors . . . high voltage bushings (8.6 Kv and below) with enclosed terminals and insulating knobs for safety and convenience . . . rotary, snap-action tap changers feature high contact pressures . . . and corprene gasket sealed tank covers.

CORPRENE GASKETED COVER

Sixty years devoted exclusively to the design and fabrication of transformers have led to a reputation of quality and performance second to none.

Additional important features and testing procedures are on their way to make certain that tomorrow's Moloney Transformers are even better through Moloney research and quality control.

Litho in U.S.A.

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components For Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Lighting by DAY-BRITE Lighting Fixtures makes the big difference...

Mr. E. L. Bailey of City Electric Company, Albuquerque, New Mexico.

"Day-Brite fixtures save our time"

The beautiful Simms Building, Albuquerque, New Mexico—one of City Electric's recent jobs.

"When we unpack Day-Brite fixtures, all the parts are there for each and every fixture.

"We don't have to spend time chasing around for missing parts that should have come with the fixture. We don't have any rethreading or recutting to do. Everything fits as it should—gives us a more uniform installation that pleases our customers.

"Naturally, all this saves our time and helps us make a clean profit on the job."

Mr. Bailey is one of hundreds of contractors throughout the country who have good things to say about Day-Brite. The more Day-Brite fixtures *you* install, the more good things *you'll* have to say about them.

61119

"DECIDEDLY BETTER" DAY-BRITE Lighting Fixtures

Day-Brite Lighting, Inc.
5412 Bulwer Ave.
St. Louis 7, Missouri

In Canada:
Amalgamated Electric Corp., Ltd.
Toronto 6, Ontario
Canada

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Announcing General Electric's 1956 RM

Load-Tap-Changing Transformer

- **Maintenance Reduced 50%**
- **20db Switching Noise Reduction**

INCREASED CONTACT LIFE in General Electric's new LRT-68 load-tap-changing switch means routine inspection and maintenance can be cut by 50% on G-E LTC medium transformers.

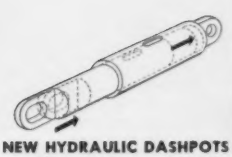
These savings have been made possible by: (1) reducing the amount of contact wear per operation, through redesigning the Geneva gear (providing smoother operation) and adding hydraulic dashpots (for optimum separation and engagement speeds) and (2) using heavier, thicker contact tips, from which more material can wear before replacement is necessary.

QUIETER OPERATION results from redesign of G.E.'s load tap changer. New Geneva gear is quieter, and mounting of motor and drive assembly under oil in switch compartment muffles noise. These features provide increased customer goodwill and less investment in sound-reducing barriers in residential areas.

RM (Repetitive Manufacture) brings you these savings in the entire line of LTC medium transformers. Also, RM transformers can be delivered to you faster . . . important in case of emergencies. For complete information, contact your G-E Apparatus Sales office, or write to Section 416-5, General Electric Company, Schenectady 5, N. Y.

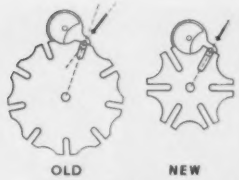
Progress Is Our Most Important Product

GENERAL ELECTRIC

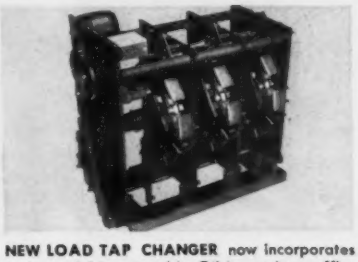


NEW HYDRAULIC DASHPOTS provide optimum separation and engagement speeds to minimize erosion and secondary arcing—increasing tip life.

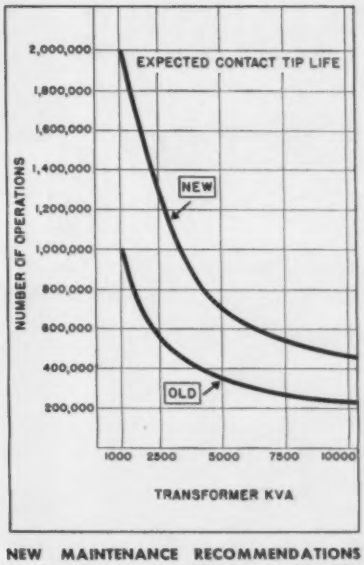
NEW FEATURES of LRT-68 switch are hydraulic dashpots and redesigned, quiet-acting Geneva gear shown in detail at left.



NEW GENEVA GEAR driving pin enters smoothly instead of 19° angle. This reduces jarring and impact, cuts noise, extends contact life.



NEW LOAD TAP CHANGER now incorporates motor and drive assembly. Oil immersion muffles noise, provides permanent lubrication.



NEW MAINTENANCE RECOMMENDATIONS are based on increasing the expected tip life, up to 2,000,000 operations for a 1000-KVA transformer.

To See More of the Advantages of G-E's New RM Transformer for '56

TURN PAGE ⟶

All the features you asked for make

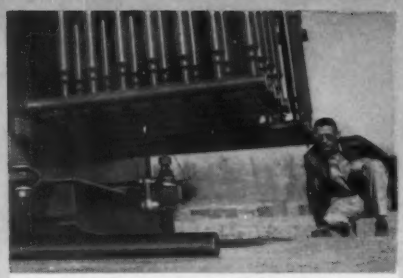
1956 Load-Tap-Changing RM* Medium Transformers

Your Best Buy

*Repetitive Manufacture

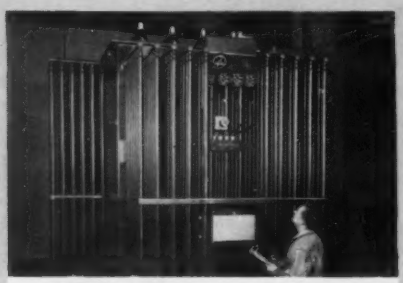
Progress Is Our Most Important Product

GENERAL ELECTRIC



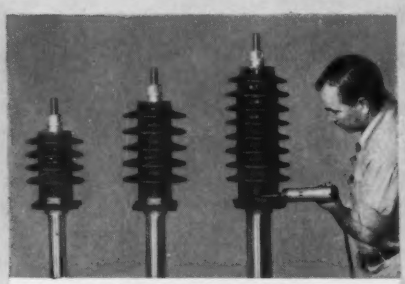
SLED-RUNNER BASE on all G-E RM transformers slides easily or rides smoothly over rollers, simplifies installation. Wide face on I-beam won't cut rollers.

LIBERAL JACKING SPACE cuts installation time and effort. Minimum of 5½ inches from ground to jackpad suitable for most jacks.

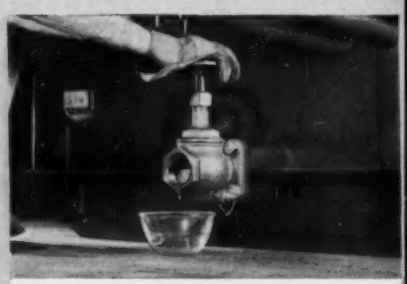


CONTROL CENTER groups all instruments and nameplate; improves visibility, makes readings extra simple.

PROTECTED ACCESSORIES. Recessed behind cooling tubes; sheltered against damage during shipping and installation.



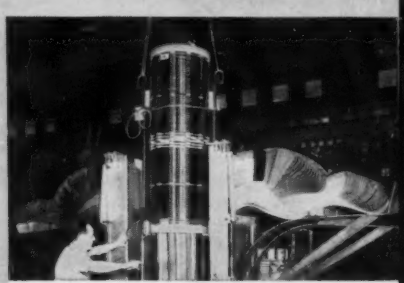
AMERICAN STANDARD BUSHINGS, used on all General Electric RM Power Transformers, help reduce bushing inventories.



FULL DRAIN permits complete filtration, removes worst bottom oil. Sampling is more accurate.

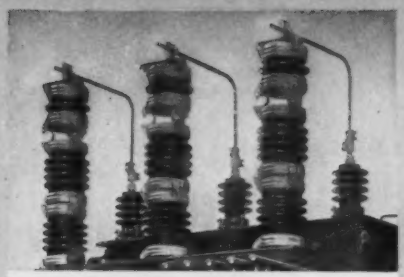
FORMEX* insulation is extremely rugged, has phenomenally high dielectric strength. Permits smaller, lighter units.

*Reg. Trade-mark G. E. Co.



PRE-FORMED CORE gives reduced losses since flux path follows grain in core laminations.

VENTILATED BASE permits free air circulation, protects against condensation, adds years between repaintings.



PRE-FITTED CONNECTORS between arrester and bushing simplify field installation, give better lightning protection.

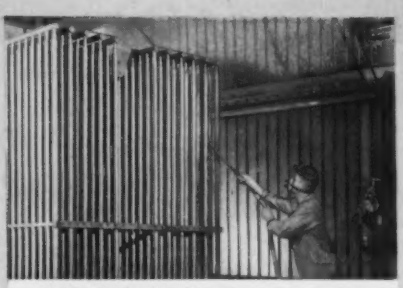
REVERSIBLE JUNCTION BOX readily adapts to overhead or underground system, simplifies ordering and interchangeability.

ONE CONTROL CONDUIT simplifies control wiring. Connections are made to one terminal board for entire transformer.

TILTED INDICATORS, where height requires, make instrument reading easier, more accurate.

CONDUITS AND FITTINGS are weathertight, can be assembled in minutes without cutting threads.

NITRILE GASKETS resist weathering, seal without adhesives. Reusable again and again, they reduce gasket inventories.



SUPER MELAGLYP FINISH saves up to two repaintings, is longer lasting in corrosive atmospheres.

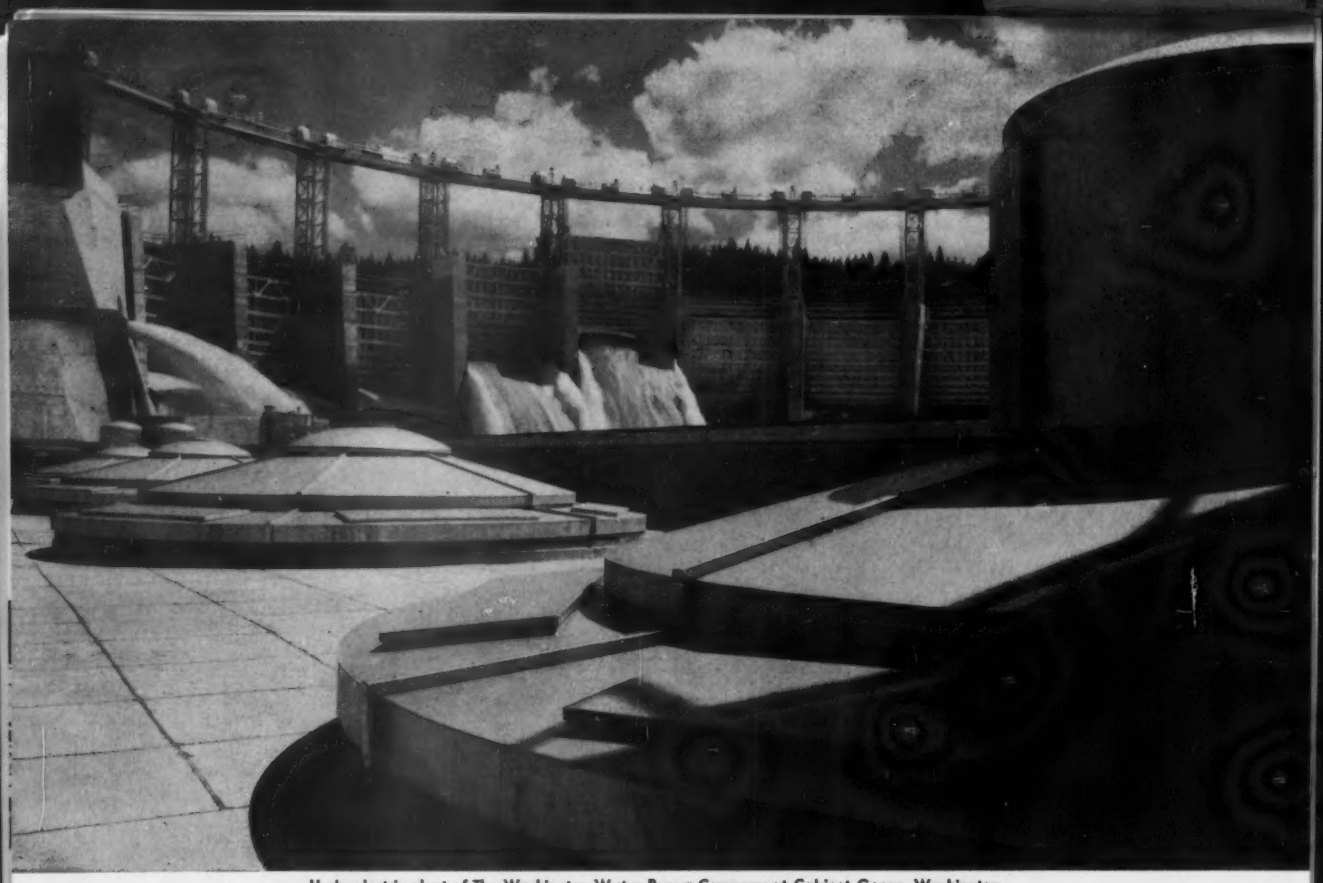
DOMED COVERS let water run off, help prevent dirt and rust accumulations. Flanged openings prevent foreign matter, moisture from rolling into tank.

SPRAY-ON PAINT, provided with every RM transformer, permits touching up after installation, before rust gets foothold.

WEDGE-TYPE TAP CHANGERS have self-aligning, rugged contacts; can carry full short-circuit current.

LARGER MANHOLES mean easier accessibility to interior; allow better and easier inspections.

GENERAL ELECTRIC



Hydroelectric plant of The Washington Water Power Company at Cabinet Gorge, Washington. This is the highest head installation in the United States using both fixed blade and Kaplan turbines.

282,000 H.P.

produced at lowest cost by fixed blade and Kaplan turbine team

In operation at the Cabinet Gorge hydroelectric plant of The Washington Water Power Company are three Baldwin fixed blade propeller turbines and one Baldwin Kaplan turbine.

These unusual 6-blade Baldwin units were designed for a normal head of 90 feet with a rating of 70,500 H.P. each at 120 R.P.M. Under certain conditions, the head reaches 105 feet, which increases total output to over 325,000 H.P. In terms of horsepower capacity, the fixed blade turbines are the largest ever installed in the United States. Each type of turbine has its own inherent advantages, and by using them in proper combination, the Cabinet Gorge plant is able to operate at maximum efficiency on a minimum investment.

All over the world, hydroelectric plants are reaping the benefits of Baldwin's 130 years' experience in designing and building hydraulic power equipment. Since we build all four basic types (Impulse, Kaplan, Francis and Propeller), our engineers can make unbiased recommendations on the type best suited to *your* flow and head requirements. On your next project, call us in early. Write BLH Corporation, Philadelphia 42, Pennsylvania, or Pelton Division, 2929 Nineteenth St., San Francisco 10, California.

Inspecting the hub mechanism of the Kaplan turbine.

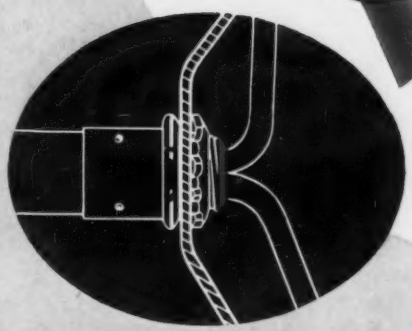
EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Electronics & Instrumentation • Hamilton • Lima • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

Red Throat

B-M 21B, THE NEW INSULATED THROAT INDENTER CONNECTOR FOR E.M.T.

Four Ways Finer



1. Protruding rounded red plastic lip of bushing prevents cutting of insulation—eliminates shorts.
2. Full thread screws into all conduit fittings. Lip of RED THROAT bushing protects thread from damage.
3. Deep dished eight pronged lock nut is easier to drive on—screws flush to shoulder and digs into metal of box for vibration proof positive ground.
4. Permanent locked-in bushing insures smooth burr-free raceway for easy fishing. No extra work and costs no more.

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

ALL BRIEGEL FITTINGS ARE U. L. APPROVED AS CONCRETE-TIGHT

Order from Your Wholesaler!

All B-M Indenter Fittings are U.L. Approved as concrete-tight and for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

UL

TELESCOPE BM SYSTEM

BRIEGEL METHOD TOOL CO.

GALVA • ILLINOIS

Warehouse Stocks in Principal Cities for Immediate Delivery!

SALES AGENTS FOR THE ELEVEN WESTERN STATES

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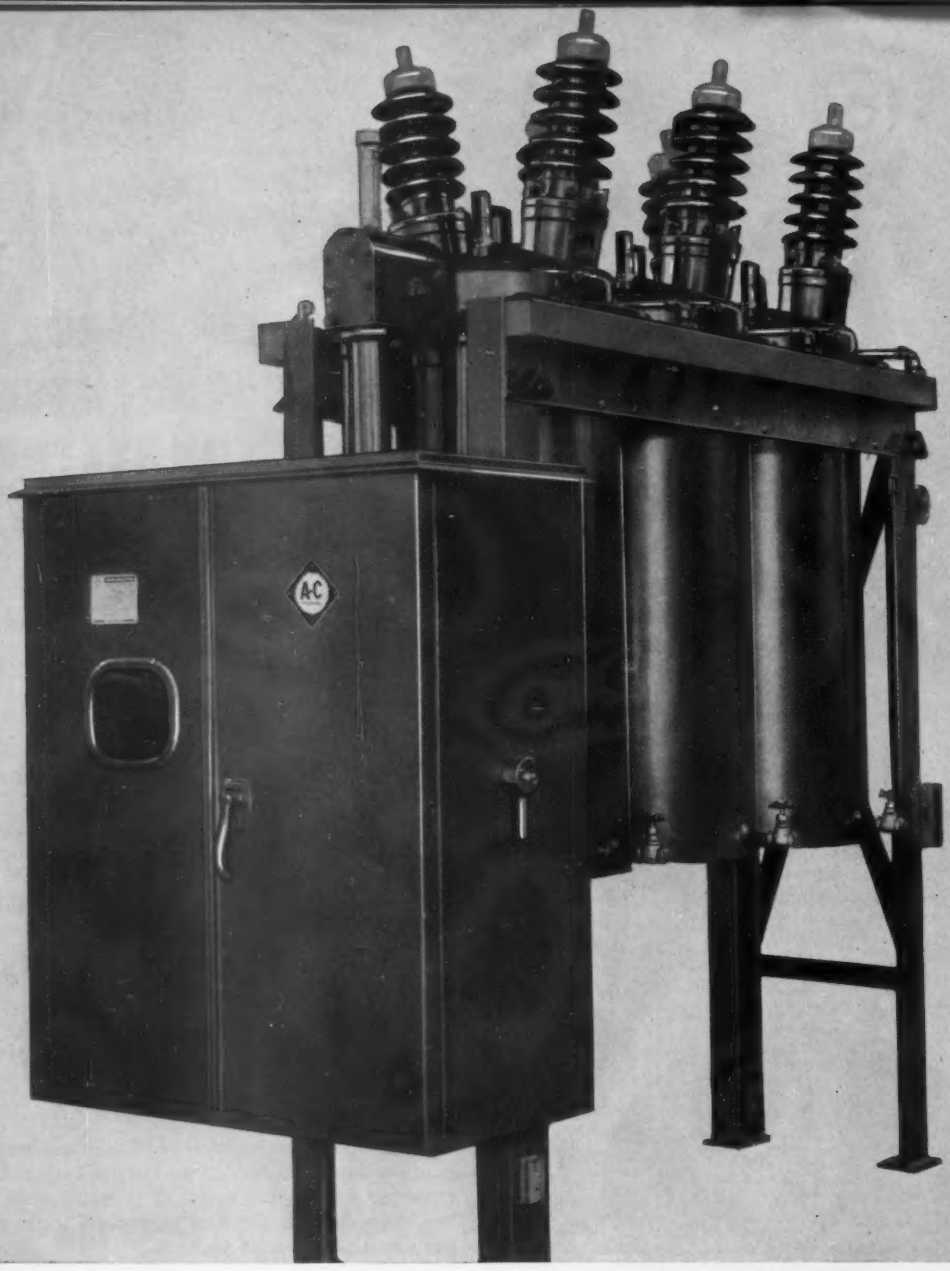
1282 Folsom Street
San Francisco 3, California

Rutkin Electrical Sales Co.
935 Stanford Avenue
Los Angeles 21, California

L. D. Head Sales
1133 West 8th Avenue
Denver, Colorado

W. W. Wheat & Son
2219—4th Avenue
Seattle 1, Washington



Now Pneu-Draulic Operators

At the request of numerous utilities, Allis-Chalmers design engineers have now made available to you *Pneu-Draulic* operators on smaller breakers.

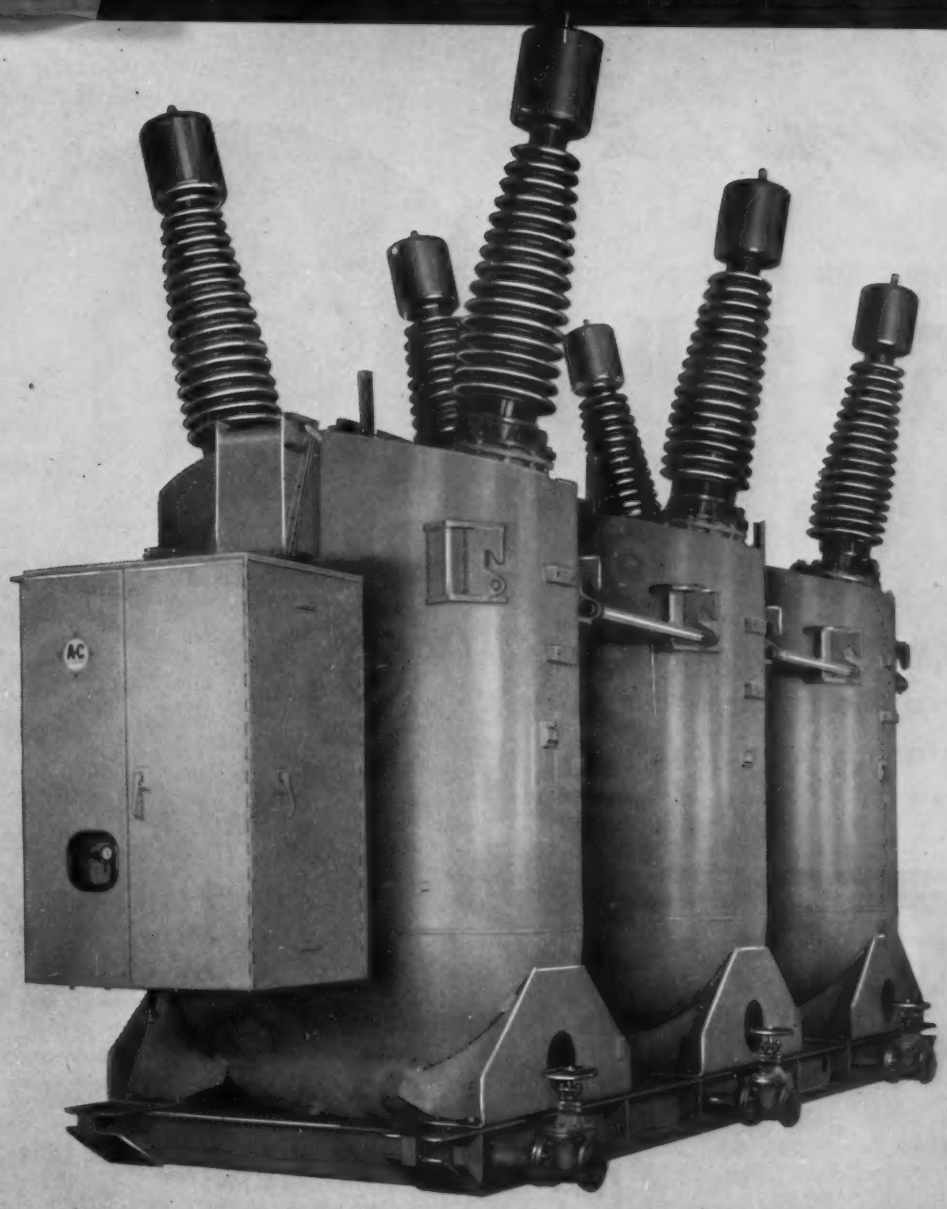
Enjoy the simplicity and reliability of the *Pneu-Draulic* operator on your next breaker.

Acceptance of the *Pneu-Draulic* operator is based on the fact that it's as simple as it looks. It eliminates the mechanical problems inherent in previous mechanisms.

For complete information call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-



for Breakers 500 Mva and Larger

Features of *Pneu-Draulic* Operator

- Simple — Has fewer parts than other types of operating mechanisms.
- Eliminates moisture, corrosion, dust problems — entire system filled with oil containing inhibitor. Filtering eliminates dirt problem.
- Provides emergency closing — can be closed safely onto energized line when no control power is available.
- Mechanically trip-free.

CHALMERS

A-C ALLIS-CHALMERS

A-5006

The Big News for '56

85% Pull-Out Strength

KUHLMAN eliminates service interruptions due to faulty transformer connections.

Depth of indent in each KUHLMAN connector is "micro-checked" to 1000th of an inch to insure that the correct crimping operation has been performed.

All factors are coordinated—depth of indent, connector diameter and conductor sizes. This results in a joint that has lower resistance and cooler operation than the conductor itself.

For your plus protection, the depth of indent on every single KUHLMAN transformer terminal connection is "micro-checked" to 1000th of an inch.

With a minimum pull-out strength of 85%—just short of the mechanical strength of the conductor—plus a conductivity greater than 100%, KUHLMAN connections actually operate cooler than the conductor. These KUHLMAN connections will outlive the long life of the transformer itself.

In the KUHLMAN laboratories, advanced studies on coordinating wire, terminal sizes and depths of indent are resulting in new standards of transformer dependability and long life. Your KUHLMAN representative will be happy to explain the engineering that has won approval for KUHLMAN transformers in hundreds of America's outstanding utility companies.

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

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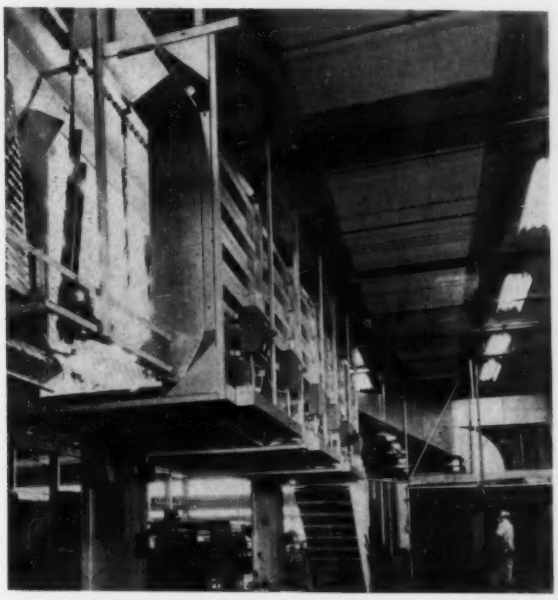
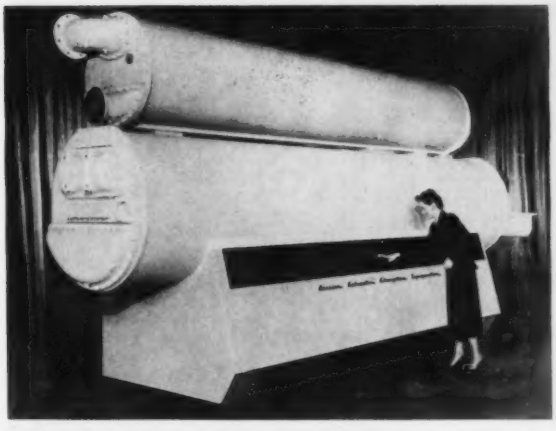
PRODUCT NEWS

New Designs and Applications



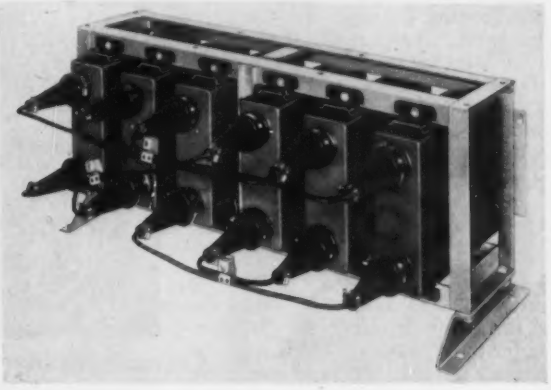
(1) SPACE AND COST SAVINGS anticipated by Westinghouse when it planned to install this Fostoria infrared oven overhead have been proved. Located at the Columbus, Ohio, plant of the company, the oven dries refrigerator and washer parts at rate of 360 hooks per minute. Space underneath is free for various uses



Absorption Machine

(2) Carrier Corp., Syracuse, N. Y.

A new line of large capacity automatic absorption refrigerating machines that produce chilled water from steam is announced by this company. Available in a full range of sizes from 100 to 700 tons, the units are used in air conditioning and process cooling systems. Features include: push-button operation, no moving parts and water is used as the refrigerant.



Submersible Capacitors

(3) Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.

Submersible capacitor units offered by this manufacturer are designed for secondary network applications. They are available in 40-, 80- or 120-kvar banks and are rated 216 v, three phase. They are mounted in a supporting structure for installation in underground network vaults.

Portable Air Pruner

(4) Weed Control Service Inc., 2605 S.W. First Ave., Portland, Ore.

This new portable pruner is reported to weigh less than 5 lb and features new efficiency for tree trimming. With the motor located next to the saw blade, the number of working parts is reduced to a minimum. The 7-in. blade revolves at 0-5,000 rpm and has a cutting capacity up to 4 in. Blade and vacuum brake are operated with fingertip controls.

Five-Channel Recorder

(5) Telectro Industries Corp., 35-18 37th St., Long Island City 1, N. Y.

This magnetic tape recorder-reproducer is specifically designed for recording and reproducing data from telemetering channels. It is a rack-mounted, five-channel, three-speed unit. Data are recorded on and reproduced from a 2,400-ft tape moving at 15 ips, 30 ips or 60 ips. Ask about Model TR-150-5.

Pressure-Plate Back Wiring

(6) Harvey Hubbell Inc., Bridgeport, Conn.

Faster, easier wiring is the reported result of a pressure-plate system designed by this manufacturer. Wire inserted through holes in the back of the fixtures is held by a pressure-plate mechanism as the assembly is tightened. The company's sales promotion department will send, at no cost, a sample of the new wiring device.

Frequency Measurement

(7) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

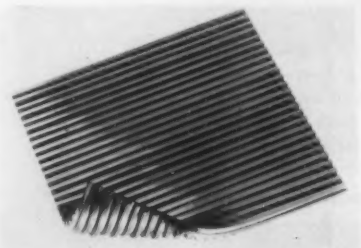
Frequency is converted to direct voltage for measuring purposes by a new transducer now available. A standard d-c torque-type voltmeter is then used as an indicating or recording receiver.

Aluminum Thimble

(8) Bethea Co. Inc., Box 1407, Birmingham, Ala.

A cast-aluminum thimble designed for use with the preformed type of dead-end has been added to this company's line of products. Rated at 12,000 lb, it will accommodate dead-ends for conductor through 336.4 MCM. The groove is flat to better fit the eye of the dead-end; the pulling eye simplifies stringing techniques, and ample clearance is provided between the ears and between the bottom of the groove and the clevis pin.

(9) ELECTRIC UTILITIES MIGHT LOOK at this microwave station that is transportable by helicopter and can be in operation in two hours after equipment has been brought to the site where it will be used. Although designed for use by the Air Force, a future use is seen for utility companies during emergencies or certain phases of line construction. The research has led to telescoping antennas and tower-top reflector mounting



Anti-Vibration Pads

(10) Vibration Mountings Inc., 76-17 Queens Blvd., Elmhurst, L. I., N. Y.

Vibration isolation of various types of office and duplicating department equipment is aided with this new neoprene pad that is said to have a maximum capacity of 60 psi. Stocked in 18x18-in. sheets or available cut to specified size. Needs no bolting or cementing.

Threader Power Unit

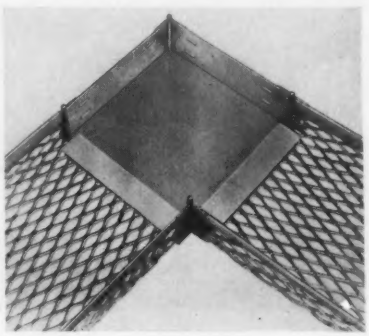
(11) Muncie Gear Works Inc., Muncie, Ind.

Porta Drive power units for pipe threaders and cable pullers now have a 20-to-1 gear ratio and are reversible. Can be operated with an ordinary carpenter's brace in the absence of power. Unit is said to be adaptable to operate pulleys, hoists and conveyors or to roll tubes in boilers.

Wire Holding Stick

(12) A. B. Chance Co., Centralia, Mo.

A new wire holding stick developed by this manufacturer is used on or around energized lines for forming, bending and positioning jumper wires. It can also be used for holding conductors during splicing operations or for pulling wires tight before tying. It is said to be strong enough to bend 4/0 ACSR.



Cable Trough Coupling

(13) T. J. Cope Inc., 711 S. 50th St., Philadelphia 43, Pa.

Reduced cost and speed-up of installation are two stated advantages of a new pin-type coupling for cable trough. Three pieces, two pins and a plate replace 13 nuts, bolts and washers.

FOR SPEED!

FOR ACCURACY!

USE BELL SYSTEM PRIVATE LINE TELETYPEWRITER SERVICE

Bell System private line teletypewriter service offers important advantages to those who operate the nation's power lines.

Teletypewriters are used for planning the day's operations, general written communications from load dispatcher to power plants, substations, other dispatchers, and offices.

The service ranges from a simple private line between two teletypewriters up to networks connecting many points. To meet the challenge of today's highly competitive market, you have *direct—fast—accurate—written—private—two-way* record communications.

Let a Bell System communications engineer make a detailed study of your communications. Such a survey may save you time and money. There's no obligation.

• ***Call your Bell Telephone representative***

BELL TELEPHONE SYSTEM

TELEPHONE TELETYPEWRITER TELEMETERING AND REMOTE CONTROL CHANNELS

Armor Rod Wrench Holder

(14) A. B. Chance Co., Centralia, Mo.

A set of loaded armor rod wrenches can be safely lifted into position with the use of this new holder, according to the manufacturer. Loaded wrenches are locked into position at the desired interval and a clamp stick is hooked into the lifting eye. Said to be usable for either straight or preformed armor rods.

Cable Tapping Device

(15) Jerrold Electronics Corp., 23rd & Chestnut Sts., Philadelphia 3, Pa.

Permanent, weatherproof cable taps can be made without severing cables or stripping lead wires with this new device. A single bolt clamps the pressure tap and feeder cable to the messenger wire. A special tool is then screwed into the tap to pierce outer jackets. After the tool is removed, the service drop connector is screwed into the tap for a positive connection. The manufacturer will study application details and make recommendations.

Terminal Strips

(16) Buchanan Electrical Products Co., Hillside, N. J.

New terminal strips featuring post-type barriers and studs for attachment of single or multiple terminal-ended or looped wires are said to provide compact units that are available to varying wiring requirements. The terminal strips are available with No. 6 studs, one through 20 circuits: Nos. 8 and 10 studs, one through 16 circuits, and with 1/4-, 5/16- and 3/8-in. studs, one through eight circuits. The company also has bulletin 561 available for information about other products.

Storage Trailer

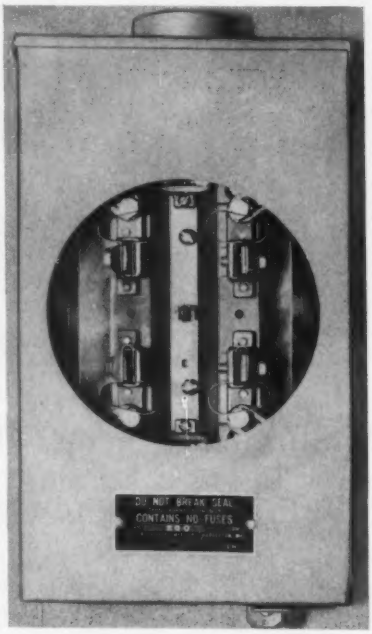
(17) International Trailer Co., 5712 Erdman Ave., Baltimore 5, Md.

This company offers a new all-metal, 17-ft mobile storage room for use as machine shop, tool room, parts room, small office, etc., on construction jobs. Price is $900. Ask about model 17-U.

Steel Framing

(18) American Steel & Iron Works, 58th and Lowe Ave., Chicago 21, Ill.

StoRack framing systems of this company provide a flexible means of building permanent or temporary steel frame structures for suspension of lighting fixtures, electrical boxes, conduit and various other electrical fittings. Also has many warehouse storage applications.



Meter Sockets

(19) Binkley Mfg. Co., Warrenton, Mo.

Two new meter sockets are announced by this company. The largest is for four terminal meters (pictured) and has a heavy-duty, ringless-type mounting. Connector terminals have two bolts and will accommodate 4/0 conductor. It is a socket for 50-amp extended range socket meters. The smaller socket, for 15-amp extended range socket meters, has wiring room for 1/0 wire size, maximum.

AUTHORIZED
FWD
SALES & SERVICE

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ARIZONA CEDAR RAPIDS CO.
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Telephone: Alpine 3-8205
CALIFORNIA: Los Angeles, 7
CALAVAR CORP.
2700 South Broadway
P. O. Box 77250
Telephone: Richmond 6292
San Francisco, 7
THE FWD PACIFIC CO.
850 Harrison Street
Telephone: Garfield 1-4971
COLORADO: Denver, 16
MACDONALD EQUIPMENT CO.
5300 Colorado Blvd.
Telephone: Amherst 6-2641
IDAHO: Boise
FEENAUGHTY MACHINERY CO.
600 Front Street
P. O. Box 639
Telephone: 2-4579
MONTANA: Helena
STEFFECK EQUIPMENT CO.
1825 North Main Street
P. O. Box 1154
Telephone: 550
NEVADA:
THE FWD PACIFIC CO.
850 Harrison Street
San Francisco 7, Cal.
Telephone: Garfield 1-4971
NEW MEXICO: Albuquerque
N. C. RIBBLE CO.
1304 North 4th Street
P. O. Box 856
Telephone: 3-3733
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FEENAUGHTY MACHINERY CO.
112 S. E. Belmont St.
Telephone: East 2186
TEXAS, OKLAHOMA, KANSAS:
UTILITY EQUIPMENT CO.
5305 N. Santa Fe Avenue
P. O. Box 9507
Oklahoma City, Oklahoma
Telephone: JA 5-2136
UTAH: Salt Lake City, 10
KIMBALL EQUIPMENT CO.
222 W. 17th Street
Telephone: 84-6109
WASHINGTON: Seattle, 4
FEENAUGHTY MACHINERY CO.
1028 6th Avenue, South
Telephone: Elliott 7808
Spokane, 2
FEENAUGHTY MACHINERY CO.
No. 715 Division St.
Telephone: Fairfax 2514
WYOMING: Casper
STUDER TRACTOR & EQUIPMENT CO.
E. Yellowstone Highway
P. O. Box 779
Telephone: 2-5381

TRAINED SERVICEMEN
GENUINE FWD PARTS

GOES ANYWHERE...
TACKLES ANY JOB!

Best Digger Truck Going!

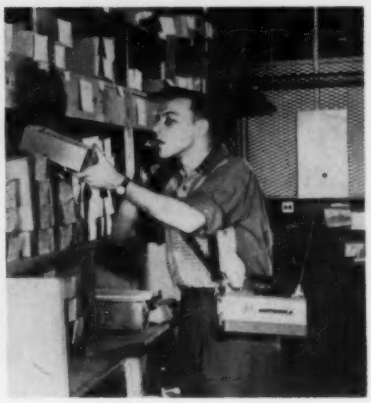
In more and more utility operations, it has become standard operating practice to depend on FWD trucks for digger work. They'll travel and work on any line job . . . as fast as any other truck. But they have a built-in reserve for emergencies . . . going and working where conventional trucks can't even travel. For the tightest traction in the roughest going . . . on any road condition, over any terrain, you'll get there faster, surer, safer with FWD digger trucks. Frames are designed to take digger twist and stress. And FWD's scientific weight distribution lets you haul more working weight on the powered front axle. For any utility line assignment, in any kind of weather, you'll give better service with less lost time, with FWD—the *best digger truck going.*

THE FOUR WHEEL DRIVE AUTO COMPANY
CLINTONVILLE, WISCONSIN • *Canadian Factory* • KITCHENER, ONTARIO

Whether you want rear diggers, or the front-mounted derrick and digger, FWD has them both in any weight you need for your own line construction and maintenance.

BUILDERS OF AMERICA'S FOREMOST HEAVY-DUTY TRUCKS
FWD
MAXI-MATIC DESIGN

Alice . . .
Brenda . . .
Diane . . .
Edith . . .
Flora . . .
Connie . . .
Gladys . . .
?
IT HAPPENED BEFORE...
IT CAN HAPPEN AGAIN
Killark
ALUMALLOY FITTINGS...
Installed and in Stock . . . Were Undamaged by WATER or RUST
No Flood Insurance Necessary With KILLARK FITTINGS
The recent floods of Diane found Killark Alumalloy fittings unaffected by water—because aluminum will not rust.
Those Killark fittings that were in stock merely had to be washed off and reboxed. We were happy to supply new containers to our distributors.
You get these advantages, because only Killark Fittings:
• WON'T EVER RUST OR CORRODE
• ARE MADE OF STRONG, DURABLE ALUMALLOY
• ARE SAFE and NON-SPARKING
Contractors like them, too, because they're LIGHTWEIGHT— ROOMIER IN DESIGN, for EASIER SPLICING
Killark
KILLARK ST. LOUIS
Dallas, 1903 Griffin St.; Denver, 1073 Galapago; Los Angeles, 412 Seaton St.; San Francisco, 714 Harrison St.; Seattle, 4130 First Ave., S.; Kansas City, Mo., 616 W. 26th St. Canadian Representatives: E. A. Adams, Griffon Sales, Ltd., 188 W. 5th Ave., Vancouver 10, B. C.; A. H. R. Louden Agency, 7608 88th Ave., Edmonton, Alberta.
ELECTRIC MANUFACTURING COMPANY
VANDEVENTER AND EASTON • ST. LOUIS 12, MISSOURI
ENTRANCE FITTINGS • CONDUIT BODIES • FLUSH SWITCH FITTINGS
EXPLOSION PROOF FITTINGS • VAPOR TIGHT LIGHT FIXTURES
EXPLOSION PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES



Portable Radiophones

(20) Motorola Inc., Communications & Electronics Division, 4545 W. Augusta Blvd., Chicago, Ill.

This new line of transistorized portable two-way radiotelephones is said to deliver up to 20 times the RF power output normally obtained in such equipment. Photo shows one in use in an inventory situation. The entire line includes RF power output ratings from one to eight watts. All are housed in formed aluminum cases and weight is reduced as much as 50% in some models.

Industrial Light Meter

(21) DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N. Y.

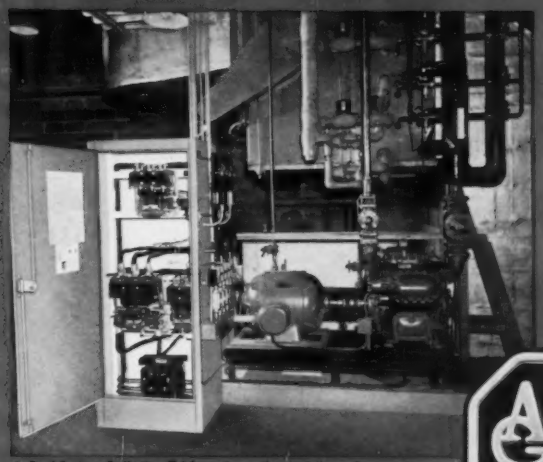
This light measurement unit consists of a 3½-in. meter with attached handle and a photoelectric cell assembly in a Bakelite housing connected by a 6-ft cord. Sensitivity of the entire unit is 10 f-c minimum to unlimited maximum. Either dual or single ranges are available.

50-Kvar Power Capacitor

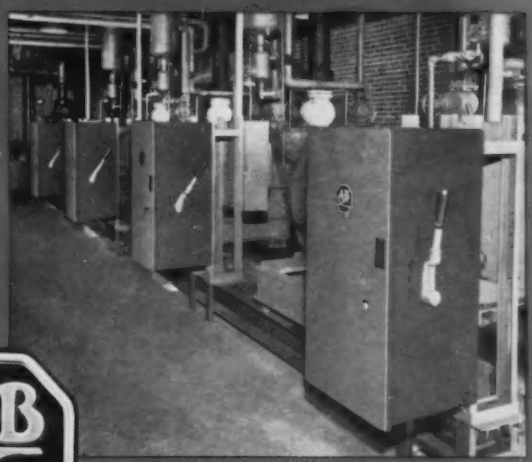
(22) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Designed to permit utilities to place more capacity on limited pole space, this company's new 50-kvar power capacitors are said to have a lower installation cost per kvar, and provide more kvar capacity per pound. They are for voltages from 2,400 to 7,960. Can be installed in the one- and two-unit racks presently used for 25-kvar capacitors.

Use Coupon, Page 60, to secure manufacturer's literature on these products

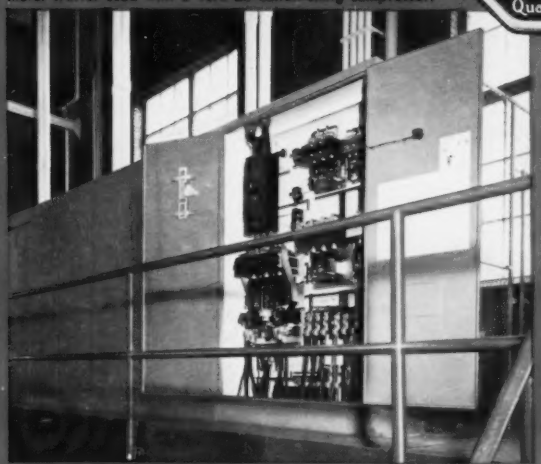


A-B 60 hp Bulletin 746 automatic autotransformer-type motor starter used with a York air-conditioning compressor.



Four A-B 125 hp Bulletin 848 manual autotransformer-type motor starters used with refrigeration compressors in a dairy.

A-B Quality



A row of A-B 350 hp Bulletin 761 automatic slip-ring motor starters with circuit breaker disconnects in the Milwaukee sewage disposal plant.

Allen-Bradley Bulletin 798 multi-unit control center used with motors ranging from 10 to 75 hp installed in a southern Kraft food plant.

ALLEN-BRADLEY STARTERS FOR LARGE A-C MOTORS ARE AS POPULAR AS THE BULLETIN 709 SIZE 1 FOR SMALL MOTORS

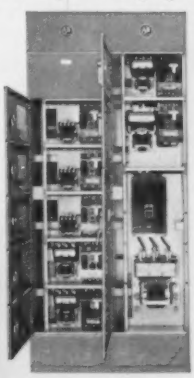
Allen-Bradley manual and automatic starters for large squirrel-cage, slip-ring, and synchronous motors—both high and low voltage—have earned the same reputation for "Quality" for which the lower ratings are known. Every operating requirement can be satisfied, either with individual units or as sections of a multi-unit control center.

Allen-Bradley high voltage starters are rated up to 1500 hp with voltages ranging from 2000 to 4600 volts. The high voltage, synchronous motor starters are self-protecting against short circuits up to 250,000 kva on 2501-4600 volts, 3 phase, 60 cycles. Oil or air break switching available. Please write for the Handy Catalog.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

A-B automatic autotransformer, reduced voltage starter with cabinet open to show control panel.

ALLEN-BRADLEY
SOLENOID STARTERS
QUALITY



A B multi unit control center with compartment doors open to show various types of motor controls.

3-56-MR

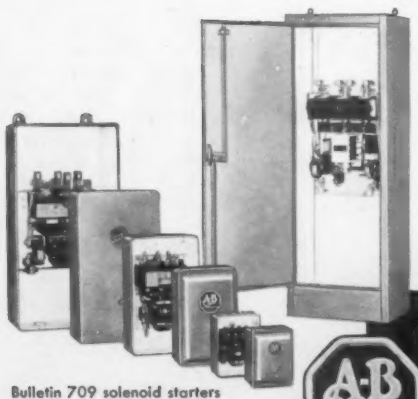
ALLEN-BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN, DRESS OR FILE THEM
EVEN THOUGH CONTACTS APPEAR PITTED AND BURNED OR ARE ENTIRELY BLACK, THEY WILL GIVE SATISFACTORY OPERATION
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY
A-B QUALITY
ALLEN-BRADLEY CO.

Left—Allen-Bradley Size 7 solenoid contactor used in large solenoid starters.

Below—Allen-Bradley Size 7 solenoid starter with overload relays in NEMA Type 1 general purpose, floor mounted enclosure.

ALLEN-BRADLEY SOLENOID STARTERS USE DOUBLE BREAK, SILVER ALLOY CONTACTS THROUGHOUT!

Eight Sizes up to 300 hp, 220 v; 600 hp, 440-550 v.



Bulletin 709 solenoid starters shown here in Sizes 0 to 6—all equipped with accurate and reliable overload relays.

All starter manufacturers use the solenoid construction and double break, silver alloy contacts for their lower starter ratings, because experience has proved this construction superior to any other. Therefore, wouldn't this experience repeat itself with the higher rated starters?

Allen-Bradley has found this to be absolutely true. Its starters of high hp rating are regularly establishing new standards of starter performance. As you go from size to size, the operating characteristics remain the same—you get trouble-free, long-life performance.

Standardize on Bulletin 709 solenoid starters—they are Tops in Quality!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

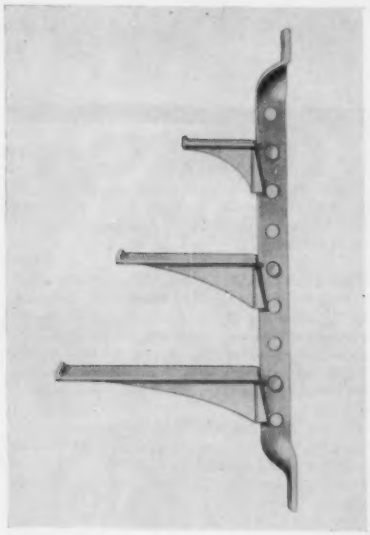
3-56-MR

A-B Quality

ALLEN-BRADLEY

SOLENOID STARTERS

QUALITY



Underground Cable Rack

(23) Hubbard & Co., 6301 Butler St., Pittsburgh, Pa.

A recent addition to the standard line of underground cable racks of this company is an aluminum alloy lock-type with movable hooks for spacing variations. It is 28¾ in. long, with mounting bolt hole spacing set at 27 in.

Color Coded Insulation

(24) Bentley, Harris Mfg. Co., Conshohocken, Pa.

Tracer stripes on vinyl coated and silicone rubber coated fiber glass sleevings for electrical insulation are now available. The tracers, with nine colors and 81 code combinations, match the heat endurance of the coating because they are of the same basic material. The development will permit manufacturers to match braided wire covering with hook-up wire coding, or eliminate coded wire by using sleeves at the termination.

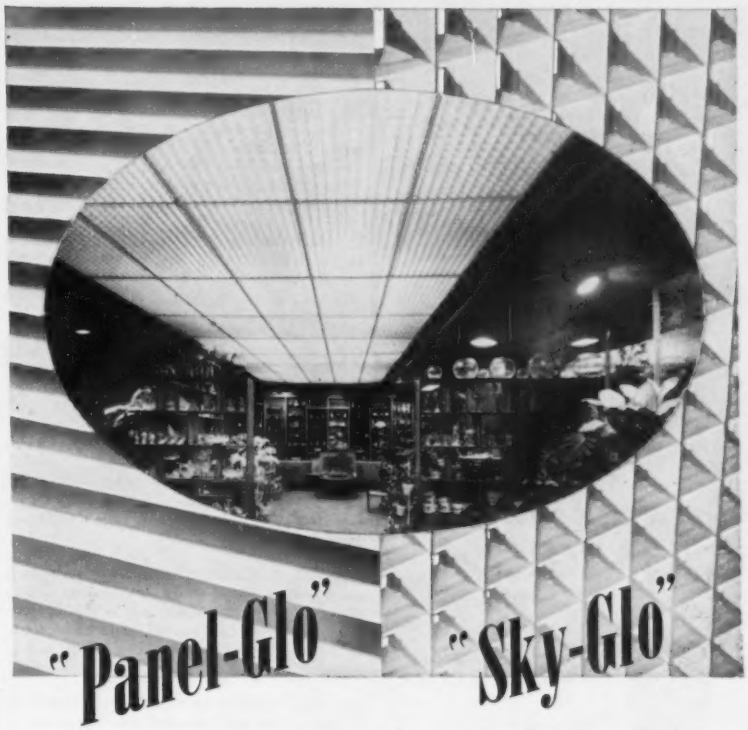
Surface Circuit Devices

(25) General Electric Co., Wiring Device Department, Providence 7, R. I.

New surface circuit wiring devices and cable greatly simplify the extension of existing wiring circuits with the addition of surface-mounted outlets. Devices available in this new line include single outlets, double outlets, single pole switches, keyless lampholders, pull-chain lampholders, junction boxes and a specially insulated flat cable with a space for nail holes in the middle.

the most inexpensive single thing you can do...

to create a **MODERN ATMOSPHERE** in any store!



lowest-cost Benjamin Luminous-Panel Ceiling. Made of translucent, white molded vinylite, which is odorless, distortion and shrink-proof. Has invisible ducts to facilitate air circulation.

finest Benjamin Luminous Louver Ceiling. Made of translucent vinylite "egg-crate" type louver panels, chemically welded at joints. Provides 45° shielding against lamp glare for greater eye comfort.

SIMPLIFICATION LIKE THIS brings you Benjamin Luminous Ceilings at a LOWER INSTALLED PRICE!

STANDARDIZED CONSTRUCTION— one easy-to-handle 3' x 3' size for louvers and panels.

EASIER, FASTER INSTALLATION— plastic material can be trimmed on the job.

NO EXTRAS TO BUY— finishing strips furnished for a neat, white trim.

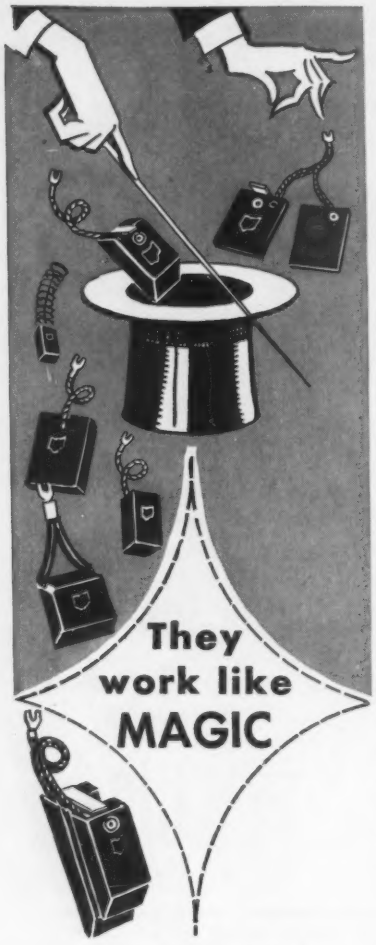
SIMPLER TO ORDER . . . BUY IT BY THE SQUARE FOOT! Just know room dimensions and type of ceiling!

Benjamin "Sky-Glo" and "Panel-Glo" translucent ceilings offer the most inexpensive way to create the modern store look that makes people want to come in and buy. You get high levels of light that display merchandise to best advantage . . . at the same time you can modernize an ugly ceiling laced with fixtures and pipes into a magnificent "ceiling of light" without additional renovation! Shown at left are some of the reasons why "Sky-Glo" and "Panel-Glo" ceilings are the most inexpensive way to modernize . . . **FREE BULLETIN AD 6222** brings you further details. Write Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Ill.

BENJAMIN TRADE MARK

Luminous Ceilings

Sold Exclusively through Electrical Distributors



but they don't come out of a hat!

OHIO MOTOR & GENERATOR BRUSHES

are carefully designed, processed and fabricated to furnish your motors with PROPER COMMUTATION resulting in longer life, economy thru lower maintenance cost.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

BULLETINS ETC.

(26) SERVICE DROP CABLES — Complete information about service drop cables is carried in bulletin DM-5556 of Anaconda Wire & Cable Co., 25 Broadway, New York, N.Y.

(27) DISTRIBUTION TRANSFORMERS — Copies of "Allis-Chalmers Distribution Transformers," 61B6159E, are available on request from the company at 939 S. 70th St., Milwaukee, Wis. It has 16 pages with photos and diagrams and full data about the company's transformers.

(28) PLASTIC CONDUIT — The special advantages of butyrate plastic pipe as conduit are stated in a booklet by Eastman Chemical Products Inc., Kingsport, Tenn. Ask for "Economical Cable Conduit."

(29) UTILITY TRUCK BODIES—Series 7000 C construction bodies with crew compartments are described in this bulletin. Write to J. H. Holan Corp., 4100 W. 150th St., Cleveland 10, Ohio.

(30) ARCHITECTURAL TROFFERS — Smithcraft Lighting Division, Chelsea 50, Mass., is offering a 36-page catalog dealing with newly redesigned architectural troffers. Has information on ceiling patterns and selection data including dimensions.

(31) VISUAL ALARM SYSTEMS—Pertinent data about annunciators, including schematic wiring diagrams and dimensions, are in this catalog of the Autocall Co., Shelby, Ohio. Adaptable to power plant supervision and other control systems.

(32) STEEL RACEWAYS—Complete information on heavy-wall and thin-wall steel raceways is offered in a 20-page booklet available from General Electric Co., Conduit Products Department, Bridgeport 2, Conn. Ask for publication No. 18-255.

(33) UNDERGROUND CONDUIT—Bulletin 56-A of Soapstone Duct Co., 3985 Beach St., Oakland, Calif., describes Oct-O-Duct, duct material for underground power lines, etc. When used with polyethylene couplings, it can be laid in the trench without concrete encasement. Complete specifications on duct and fittings are carried.

(34) ROTARY SWITCHES—Rotary switches for operating electrical instruments and for control functions are described in bulletin 14B8112 of Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee 1, Wis.

(35) ALUMINUM PRODUCTS—Current information on Kaiser aluminum mill products and services is contained in a new 24-page booklet now available from Kaiser Aluminum & Chemical Sales Inc., Industrial Service Division, 1924 Broadway, Oakland 12, Calif. Ask for PR-256.

(36) LIGHTING FIXTURES—Great Northern Mfg. Corp., 1056-8 N. Wood St., Chicago 22, Ill., is offering complete data and illustrations of its fluorescent and mercury vapor lighting fixture products. Contains specifications and prices.

(37) ALUMINUM SERVICE DROPS—Complete information on aluminum triplex service drops is carried in PR 255 of Kaiser Aluminum & Chemical Corp., Industrial Service Division, 1924 Broadway, Oakland, Calif. Fully illustrated, it gives methods of dead-ending and types of triplex available from the company.

KILL TWO BIRDS WITH ONE STONE — Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after May 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

If described in advertising, fill in page number

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NAME..... TITLE.....

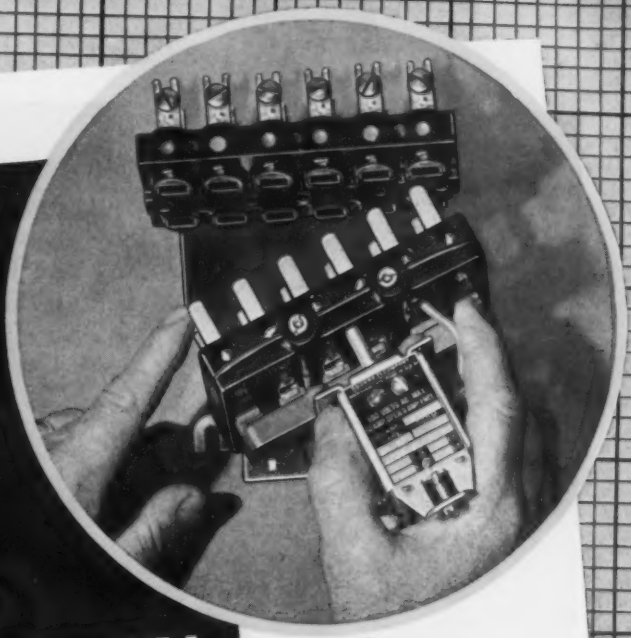
COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Now... PLUG-IN RELAY FOR INDUSTRIAL SERVICE!



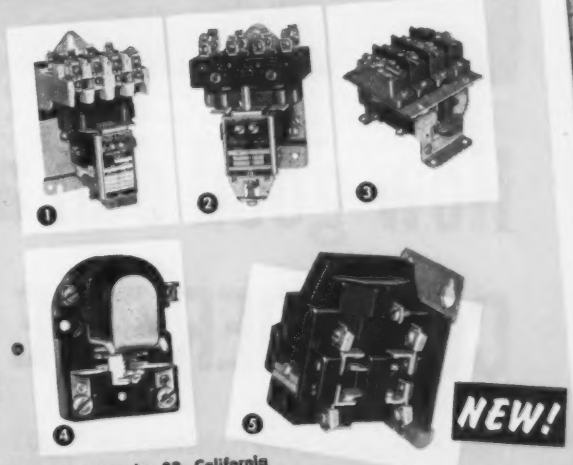
Qwik Change

• A screwdriver and five seconds are all you need to remove this new **PLUG-IN** relay for normal inspection, maintenance or replacement! That's big news in these days of "pushbutton" operations when even a few minutes of down-time can mean thousands of production dollars down the drain.

Square D Field Engineers have sensed this ever-increasing problem in their contacts with machine tool builders and industrial plants throughout the country. Square D design engineers have followed through with this, the first **plug-in** relay built specifically for machine tool use. Another example of design leadership!

HERE ARE OTHER MEMBERS OF SQUARE D's RELAY TEAM

1. **TYPE B** (15 Amperes, 600 Volts) Heavy-duty construction with hardened parts for severe machine tool service
2. **TYPE A** (10 Amperes, 600 Volts) Designed for general-purpose applications involving normal operations
3. **TYPE P** (Rated 10 Amperes, 600 Volts) Totally-enclosed contacts make this type especially suitable for operations in dusty or linty locations
4. **TYPE C** Used as auxiliary devices for controlling small, single phase motors or other light loads
5. **TYPE D** (Rated 10 Amperes, 600 Volts) This new and most compact of all Square D relays is ideal for general-purpose applications involving very limited space



Write for Bulletin 8501

Address Square D Company, 4335 Valley Boulevard, Los Angeles 32, California

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

PRECISE TEST-FIRING of samples (light cones) under simulated production conditions of time and temperature foretells fusion properties of each shipment of raw materials.

How good can an insulator be? CONSIDER THE EFFECT OF RAW

The *quality* of raw materials used in the manufacture of porcelain suspension insulators has a direct bearing on insulator performance.

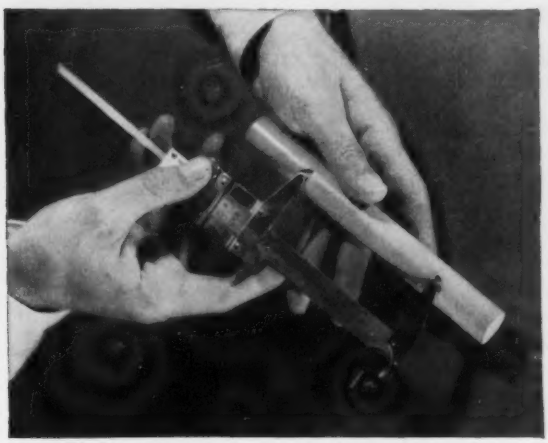
Only a slight variation from standards in the chemical composition of clay, in the vitrifying characteristics of feldspar, or in the purity of flint can result in loss of insulator strength.

To protect you against the possibility of insulators made of inferior raw materials, Locke subjects flint, feldspar and clay to 14 different quality control tests... *before shipments even enter our plant.* This prevents trouble before it starts!

The case of Locke Raw Material "Quality Control" is typical of the extremes to which Locke goes to assure trouble-free insulator service on your system.

DROP BY DROP, an analyst determines the exact proportions of silica and oxides of aluminum, sodium, potassium as well as other elements in clays and feldspar. Results are used as a production guide to assure uniformity.

FINENESS OF FLINT and feldspars is accurately determined by a screen test and compared with standards before a shipment is accepted. This physical property has direct effects on firing characteristics of these materials.



AS CLAY SHRINKS by about one eighth between forming and firing, shrinkage properties must be known in advance, so that insulator size can be accurately maintained. Test bars are extruded, notched and measured before and after drying, as well as after firing.

CLAY SAMPLE, mixed by two augers in a temperature-controlled hopper predicts how material will behave in the plastic state. The applied torque required to deform the clay sample is indicated on a chart.

MATERIALS!

For a brief and complete picture story of suspension insulator quality control, just call your Locke representative.

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

LOCKE Suspension Insulators

Performance Protected by

77 POINT
QUALITY CONTROL

ELECTRA'S HUSBAND

"Set Your Sights Lower"

Electra has the embarrassing habit of storing up bits and pieces of information to be dropped at a time when their effect will make her look brilliant —and vice versa. As a case in point, the other evening we were having cocktails with an executive of one of the larger manufacturers out here on a recruiting tour of Western universities. The conversation naturally had gyrated to the subject of engineering manpower and Electra had been upholding her end with a sufficient number of comments to indicate she was politely interested.

"You've been on the road long enough now to form an impression of this year's crop," I remarked. "How does it stack up?"

"Each year it seems to get a little bit tougher," our guest replied. "It used to be that we could be a little bit selective in finding new blood but now the shoe's on the other foot. Competition for the graduate engineer ranges all the way from terrific to tough, but it's all competition."

"Is it a matter of salary?" Electra asked politely.

"Not necessarily, although we in the electrical industry do have our problems in meeting some of the prices that other groups are willing to pay. No, I think that recruiting today is more a matter of good salesmanship and getting across the story that the company has to offer in terms of money, benefits and, most important, real opportunity for personal growth and development. Recruiting these days is just plain hard work and hard selling."

"I can believe that," I commented. "From figures I see, it is quite apparent that engineering degrees are not being granted as fast as the economy is growing. All companies are growing bigger, and there are more engineering firms being created to meet the demands of the new specialized technologies that are a part of what we call progress."

"Exactly right," replied our guest. "Recruiting is just following the old economic law of supply and demand. For example, we are graduating this year about 25,000 new engineers and there are probably 5,000 companies who are in the market for their services. That's an average of about five new engineers per company. Even a relatively small corporation could use that number every year. We could use several hundred if we could get them. The number we probably will get will hardly more than cover our attrition rate due to resignations, retirements, deaths, not to mention promotions that take engineers into other phases of company operations."

"That sounds like you need a refill," I said signaling the waiter. And before I could add any further comment, Electra moved into the conversation with both barrels.

"It seems to me," she said demurely, "both of you are worried more about the demand than you are the supply. Now, me, I'm worried about the supply of engineers. It's not because I want more labor-saving gadgets or because I'm worried about dividends. I have a few shares of your stock," she explained, looking at our guest. "It was something I read the other day that makes me feel that you men aren't attacking this problem of the supply of engineers like a woman would."

"I might have known that Electra would be lying in the weeds waiting to pounce on us," laughed our guest. "What got you all excited about this engineering manpower situation? I admit that the problem is getting no better fast and maybe the women's viewpoint would help."

"All right," said Electra, "you can laugh if you want to, but I like my skin as well as the next person and I'd like to feel that it was going to be kept reasonably intact."

"It's a pretty skin, too," responded our guest gallantly, "but what has that to do with the engineering manpower situation?"

"It may be rather devious woman's logic to you," smiled Electra, "but I was reading, just the other day, the remarks of an Air Force general who commented that we need lots more engineers and better engineering technology to keep the Soviets out of our hair—literally, if you know what I mean. He said that, in today's concept of defense, technology will supplant manpower as a measure of force and then he pointed out that, in numbers at least, the Soviets are winning the race for technological superiority. If I remember his figures correctly he said that Russia is graduating 2½ times as many engineers as we are in this country, and their rate is still going up. They must be pretty good engineers, too, because he listed a lot of achievements in aircraft design and nuclear developments that aren't produced by dumbbells. What I'd like to know is if there is anything being done to try and match that performance."

"There is quite a bit being done," replied our friend, "but it's being done by individuals, local engineering societies, and it certainly wouldn't lead to cultivating a graduate engineering crop on the scale that you mention."

"It would be quite a project," I agreed, "for to graduate 60,000 engineers a year you'd have to start off with freshman classes in the order of a quarter of a million. And you can't regiment high school graduates into engineering courses like they do in state-controlled economies."

"That's just my point," shot back Electra, "you can't regiment them into engineering but you could sell them on the idea. You know very well that most high school kids don't have the vaguest notion of what engineers really do and, even if they did, a lot of them would think that it wasn't worth all the hard work necessary to get an engineering degree. I'll bet you that a good sales campaign aimed at the high school kids would sell a lot of them on an engineering career. Not only the boys, but the girls too, and both of you know that women make just as good engineers as men."

"Now that you've gone this far, you might as well give us the works," I sighed. "Do you have any ideas on how this should be done?"

"That's your department," said Electra, "but if I were you I'd set my sights lower. You've been talking about getting a crop of engineers so you'd better plant the seed down where it can grow—at the high school level. The big industries of this country spend hours and hours on TV selling themselves and their products to the adult public. Maybe they ought to try spending a little of that time selling engineering to the teenagers. I don't pretend to be an advertising expert but I've been on enough inspection trips with you to know that there's enough drama in the work-a-day world of American industry to eclipse Flash Gordon or Buck Rogers. You are always howling about how much time your nephews and nieces spend in front of the TV set—you can't lick it so why not join it and put it to work for you?"

This Seal

shows that every Allis-Chalmers distribution transformer is impulse tested.

Do Your Distribution Transformers Have This *Proof* of Quality?

REGARDLESS of size or voltage, every Allis-Chalmers distribution transformer brings you proof of insulation quality. The "impulse tested" seal on every unit shows that impulse tests were made during production with the most modern impulse testing equipment available to the industry.

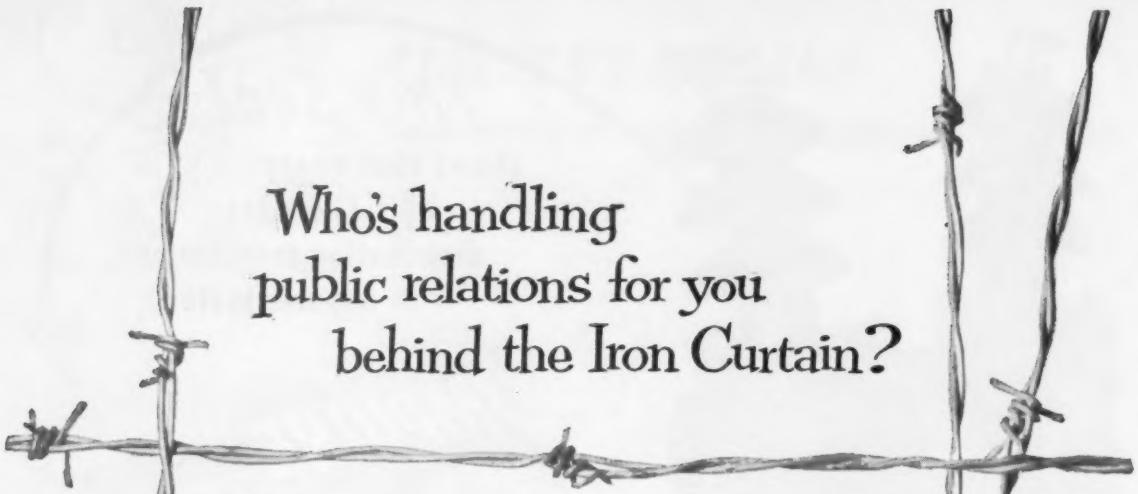
Eight years ago Allis-Chalmers initiated impulse testing for pole-type units. Now, every unit through 500 kva, 69 kv and below, gets this positive check to assure that its insulation can withstand severe lightning and surge conditions. No lightning arrester is used. Allis-Chalmers tests the transformer, not the lightning arrester.

Get the facts on this and other A-C production line tests that result in distribution transformers of the highest quality. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4877

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



Who's handling public relations for you behind the Iron Curtain?

It's not an easy assignment—or the kind you'll find many people volunteering for.

But there *is* an important "public relations" job to be done behind the Iron Curtain—for you . . . for America . . . for the whole concept of freedom, free enterprise and individual rights. This job is an opportunity and a challenge as well as a serious responsibility for American business. Fortunately, with your help, there *is* an agency that can do the job—*Crusade for Freedom*, which supports Radio Free Europe and Free Europe Press.

Both these powerful, privately operated organizations continually challenge the barrage of Communist misstatements and false truths. Using saturation radio broadcasts and mass newspaper drops from message balloons, Radio Free Europe and Free Europe Press are constantly on the offensive against the Red campaign to annihilate right, reason and national pride.

Continued and heated Communist protests testify to the tremendous effectiveness of Radio Free Europe and Free Europe Press. Support freely given by free American business and private citizens will increase this effectiveness and the scope of their operations. A contribution now is perhaps the best investment you can make towards a peaceful, prosperous world.

Give generously. It's your future!

Check list for business executives in the Crusade for Freedom

- ☐ Order display material for your company bulletin board.
- ☐ Plan a paycheck stuffer to fully acquaint your employees with the importance of the Crusade for Freedom.
- ☐ Plan to conduct an in-company solicitation.
- ☐ Match employee funds with *your Truth Dollars.*

PUBLIC SERVICE ADVERTISING COUNCIL

For campaign material and information write *CRUSADE FOR FREEDOM,* 345 East 46th St., N. Y. C. 17.

HOLOPHANE REFRACTORS Help to Triple Lighting Efficiency *on the* George Washington Bridge

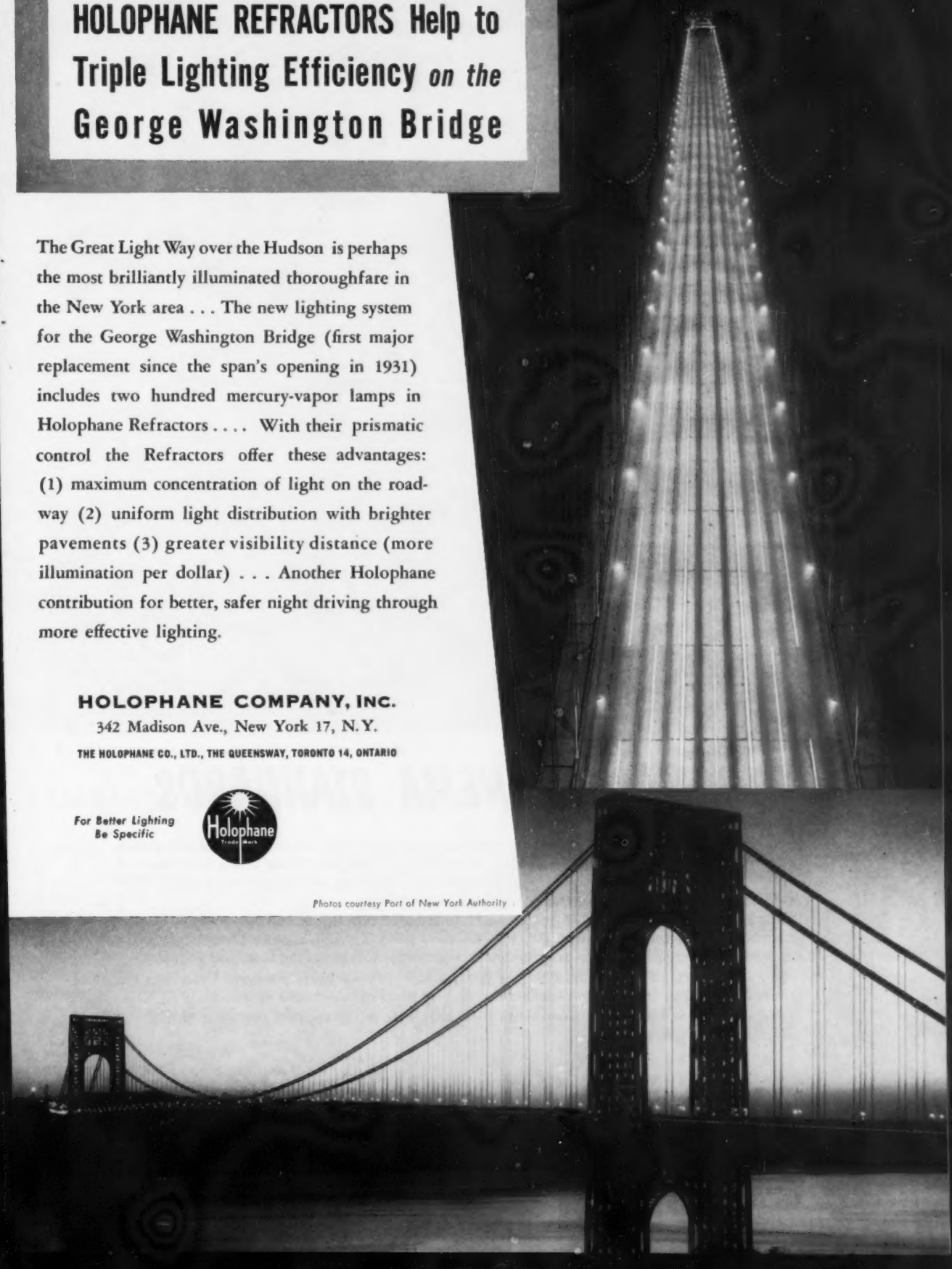
The Great Light Way over the Hudson is perhaps the most brilliantly illuminated thoroughfare in the New York area . . . The new lighting system for the George Washington Bridge (first major replacement since the span's opening in 1931) includes two hundred mercury-vapor lamps in Holophane Refractors . . . . With their prismatic control the Refractors offer these advantages: (1) maximum concentration of light on the roadway (2) uniform light distribution with brighter pavements (3) greater visibility distance (more illumination per dollar) . . . Another Holophane contribution for better, safer night driving through more effective lighting.

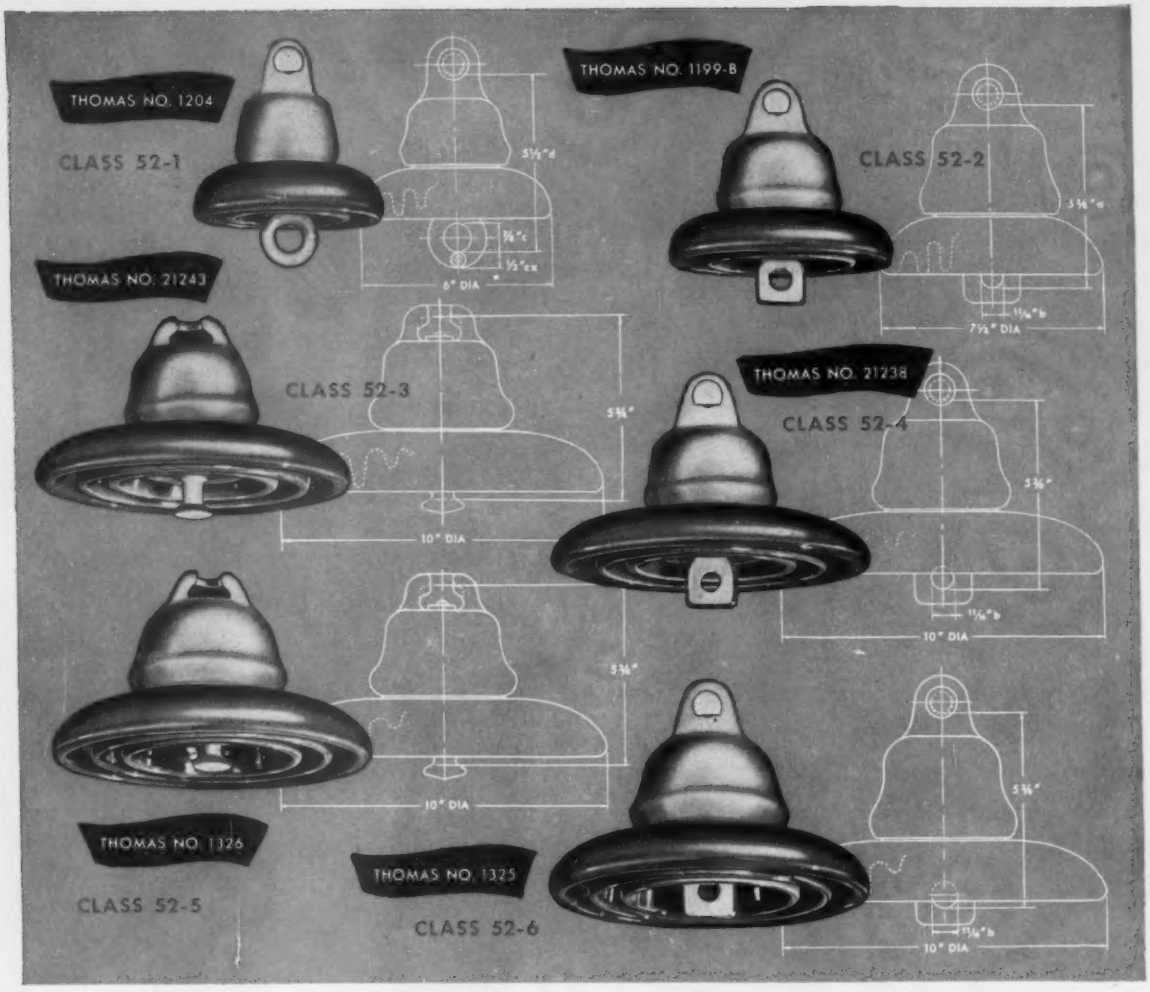
HOLOPHANE COMPANY, INC.
342 Madison Ave., New York 17, N.Y.
THE HOLOPHANE CO., LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

For Better Lighting Be Specific

Holophane Trade Mark

Photos courtesy Port of New York Authority





THOMAS EEI-NEMA STANDARDS

Two of the strongest arguments for standardization are stock simplification and the advantages of interchangeability. Although we catalog many different designs, we are 100% in support of any standardization that we believe helps the industry. Therefore, we suggest users specify EEI-NEMA Standards for their suspension insulator requirements.

Thomas insulators are backed by 83 years of ceramic experience and knowledge. Quality material, precision manufacturing and PROOF OF PERFORMANCE make Thomas porcelain the standard of comparison for discriminating engineers throughout the Electrical Industry.

In 1907, Thomas designed and made the first cap-and-pin suspension insulator. Units installed that year are still giving trouble-proof service after 49 years of continuous operation.

Specify Thomas EEI-NEMA Suspension Insulators with full confidence that their quality and value cannot be surpassed.

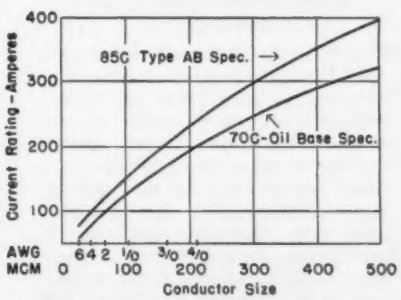
The R. Thomas and Sons Co.

LISBON, OHIO

1873 THOMAS INSULATORS our 83rd year RELIABILITY 1956

Greater current-carrying capacity of Type AB butyl high-voltage cable helps users cut costs, use new or existing facilities more efficiently.

Cable that takes the squeeze out of crowded conduits



85C OPERATING TEMPERATURE rating of Anaconda Type AB cable affords 22% more current-carrying capacity than 70C rated materials, when installed in conduit at 40°C ambient temperature.

Now you can obtain the same amount of current with a smaller cable... or more current with the same size cable—with Anaconda's Type AB butyl high-voltage insulation.

For Anaconda Type AB butyl-insulated cable is recommended for operation at 85*C operating temperature*. Industry specifications recommend 70C for oil-base insulations. Thus, as the curves on the chart show, Type AB delivers 22% more current-carrying capacity . . . and more amps per dollar.

New Engineering Bulletin EB-27 gives you full details on performance of Type AB insulation in 15 Industry Specification Tests. Ask the Man from Anaconda for your copy. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

56295 Rev.

SEE THE MAN FROM ANACONDA®

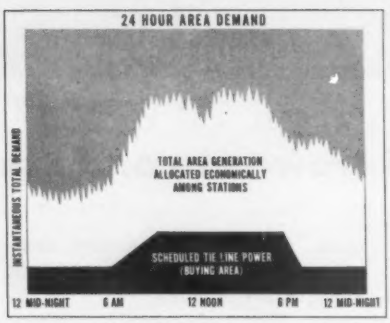
—pioneer in BUTYL INSULATION

FASTEST WESTERN SERVICE — At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for *every type of application*. Anaconda's Western Distributors thus can assure the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.

Increase in operating economy is assured as world's first fully automatic dispatching system goes on the line. Here, J. A. Keeth, Vice President, Kansas City Power & Light; C. M. Sagmoen, G.E.; H. S. Day, Manager—G.E. Specialty Instrument Sales, discuss automatic features that permit instant balancing of system's units.

First fully automatic load dispatcher heralds new horizons in utility power system economics

New system computes generator, transmission costs, allocates load for lowest fuel costs, reduced man-hour expenses



TPYICAL DAILY LOAD CURVE can now be fed more efficiently. The automatic dispatching system even calculates transmission losses.

BASIC DESIGN CONCEPTS began with work on such computers as this network analyzer. Here, G. Kron and Dr. L. K. Kirchmayer discuss system integrating with S. B. Crary (left), Mgr.—Analytical Engineering, in early planning stage of new system.

Biggest advance to date toward helping electric utilities realize optimum system operating economy is the world's first fully automatic load dispatching system. Developed for Kansas City Power & Light Company by G-E engineers, the new system computes the costs of electric power generation and recognizes transmission losses, balances the output of the system to provide immediate and most economical meeting of widely varying loads, reducing fuel and man-hour requirements.

HOW IT WORKS

From an operating standpoint, the new automatic dispatching system considers operating efficiency and capacity of each turbine-generator plus widely varying transmission costs. With this information, the new system continuously distributes the load most economically among the machines. As a result fuel costs are held to a minimum. And, since detailed loading schedules are not required, manpower is relieved of routine calculations.

INTERCONNECTIONS, POOL OPERATION

The K.C.P.&L. system represents important progress toward helping utilities cut generation and transmission operating costs to an absolute minimum. Today, system interconnections and pool operation make automatic control increasingly desirable. For more data on how your company can achieve greater operating efficiency, contact your G-E Apparatus Sales Representative, or write for GEA-6296 to the General Electric Company, Schenectady 5, N. Y. 301-314

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 116, NO. 3 MARCH 1956

Stepped-up industry-wide promotion promised by new

Live Better . . . Electrically Program

It was the biggest business conference in history and it introduced the electrical industry's largest and most spectacular promotional effort to date —the "Live Better . . . *Electrically*" program. By means of a nation-wide, closed-circuit television network covering 77 cities, more than 40,000 electrical industry executives and business leaders in the fields of banking, real estate and home construction were introduced to this promotional plan designed to double or triple the tempo of domestic appliance (and energy) sales.

The new program is by far the most ambitious yet undertaken by the industry to promote the benefits of electricity for the American family. Originally conceived by General Electric, the concept and development of the campaign soon assumed the stature of an industry-wide activity encompassing not only all phases of the electrical industry but also allied segments of American business such as financial, architectural and real estate groups.

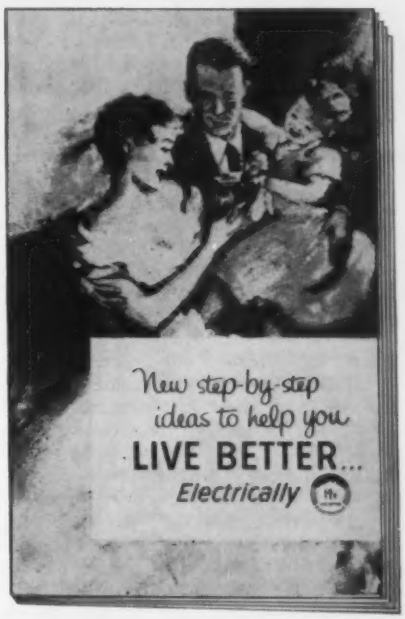
In the kickoff coast-to-coast closed-circuit television presentation local utility organizations sponsored meetings in key major cities. There business leaders vitally interested in the national housing program were given details of the national advertising, publicity and educational program that will take the story of "Live Better . . . *Electrically*" to the public. At the same time they were shown the promotional tools that could be used to spark enthusiasm for the campaign in each locality. A primary objective of the program is to increase the domestic use of electricity by 2,000 kwh per year per family by 1960. The attainment of such a goal would involve the sale of hundreds of millions of dollars' worth of wiring, appliances and other utilization products that bring comfort and convenience to modern living.

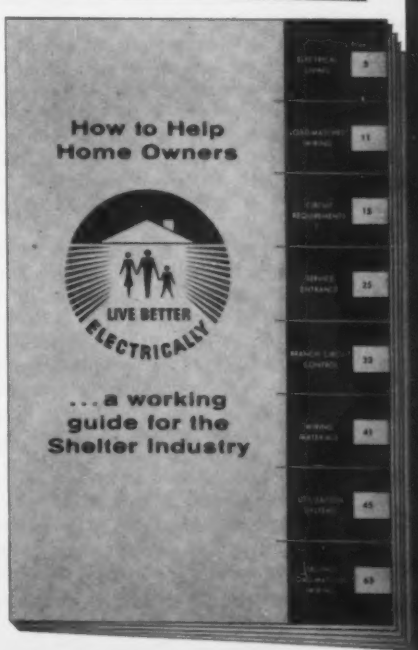
At the national level, the major aim is to sell the public on the concept of living better electrically. This will be done through an impressive and dramatic series of advertising in the nation's leading magazines. The "Live Better . . . *Electrically*" message also will be beamed to the public through television networks which will dramatize the theme song "Live Better . . . Electrically" and tell the story through clever animation.

In addition to the promotion of the theme itself, the "Live Better . . . *Electrically*" emblem, shown here, can be expected to be widely used in the promotional activities of individual electrical manufacturers on their advertising brochures, and other promotional material and activities.

At the local level, the "Live Better . . . *Electrically*" campaign has a well-developed kit of sales tools and promotional materials. For example, there are local spot television commercials of 50-second duration that use the theme song and catchy jingles to put across the message. There are numerous mailing and handout pieces selling the better living idea and a variety of display materials such as window banners, counter cards, truck posters and even postage meter advertisements.

Two excellent books also are available. One entitled "How to Help Home Owners" is a working guide for the shelter industry that can be used by





"This campaign, carried out with enthusiasm, could be a built-in stabilizer for the whole economy."

—James D. Mitchell, vice-president, American Trust Co., San Francisco

"Dealers can, and should, play a bigger role in this great effort to dramatize electrical living."

—Jerry Heilbron, Heilbron Electrical Co., San Diego

builders, contractors, realtors as well as promotion and sales people within the electrical industry itself. The second is a book designed for use by the customer. It shows, room-by-room, how to live better electrically.

Most impressive of the promotional aids is an entertaining 30-minute color movie entitled *Meet Mrs. Swenson* dramatizing the impact of electricity on the home life of the typical American family. This film will have a wide showing across the nation at women's clubs, schools, and other public gatherings devoted to home improvement.

All of these materials are available at low cost through the local electric utility in each area. Response to the hour-long closed-circuit TV presentation was considerably more than enthusiastic both by the electrical industry leaders and those in the allied fields of home building and development. The TV presentation itself was a dramatic and effective vehicle for pointing up the benefits of the program both to the industry and to the customer. Cities not covered by the original closed-circuit telecast will have the opportunity to see the presentation by means of kinescope reproductions. Every group which has viewed the presentation has expressed the desire and intention to initiate immediate action in its local area. Evidence of the response in the Western region is provided by a survey of industry and business leaders made by ELECTRICAL WEST during the latter half of February. A preview of the stepped-up tempo of promotional activities resulting from the introduction of the "Live Better . . . *Electrically*" campaign is provided in the summaries of these personal interviews that follow.

O. R. Doerr, vice-president in charge of sales, Pacific Gas and Electric Co.:

Beginning in March our electrical advertising will carry the "Live Better . . . *Electrically*" slogan. We will use poster boards, bill stuffers, truck banners, office displays; our home economists will tell the story at cooking schools and before other groups; our field organization will devote a substantial part of its time to working with dealers and doing the many thousands of things necessary to make this program effective in the field.

The movie *Meet Mrs. Swenson* will be incorporated into the mass promotion program co-sponsored by Northern California Electrical Bureau. It will be shown at approximately 75 public meetings during the year. In addition the film will be available for booking by other groups.

To meet our five-year target will require the sale of electrical appliances, lighting equipment and wiring averaging $465 per home. In northern and central California that means a total of $600,000,000.

W. F. Lovelace, manager, residential sales, Los Angeles Department of Water & Power:

It is our purpose to do our utmost to see that the slogan and the "Live Better . . . *Electrically*" emblem are seen in as many places and as frequently as possible. This will be done through our display windows and will be the theme of our exhibit at the Home Show in June. Our regular dealer bulletins will bear reference to the program and urge that the dealer cooperate in publicizing the theme. In our home economics demonstrations, where we reach more than 30,000 customers annually, the program will be broadened to embrace the "Live Better . . . *Electrically*" theme. Simultaneously, when they hold home economics classes in the schools, reference will be to the benefits of better wiring and better lighting through the use of major electric appliances.

Materials provided by the advertising agency handling the "Live Better . . . *Electrically*" program will be widely distributed.

We have found that the closed-circuit telecast of Feb. 8 had a terrific impact and within one week of the time builders have stated that they feel that they should follow the trend and equip their homes in accordance with the demand that will be created. Accordingly, they have committed themselves verbally to 100-amp wiring and the major appliances in more than 1,000 homes that will be built this year. Since we had not anticipated such direct and immediate results, we are naturally very happy about the outcome of our program.

Guy W. Thomas, commercial manager, Public Service Co. of Colorado:

Reaction in Denver was highly enthusiastic. We will use the promotion as a tool to increase appliance and wiring sales. We plan to use the TV and radio spots. We'll develop a strong local advertising program using TV, radio, newspapers and direct mail.

The company anticipates 15,000 additional customers in the Denver metropolitan area each year for the next five years for a total of 75,000; expects the average residential kwh consumption to increase 1,000 kwh annually by 1960. Appliance sales in the Denver metropolitan area will total an estimated $220,000,000 in the next five years. Wiring potential is $40,000,000, but we expect an actual of 10% or $4,000,000.

E. Z. Fredricks, sales manager, Tacoma City Light:

Tacoma City Light cooperated with Puget Sound Power & Light Co. in sponsoring the Tacoma meeting, which was attended by 338 persons, including observers from Mason and Lewis County PUDs. Reaction was enthusiastic.

The "Live Better . . . *Electrically*" slogan will be added to the utility's institutional ads and we will use the TV and radio spots made available through the program. The film, *Meet Mrs. Swenson*, will be presented before service clubs, PTA and other groups.

Tacoma City Light hopes to increase average kwh residential use by 1,000 kwh a year to a total of about 12,000 kwh by 1960.

Harold Moore, general sales manager, Southern California Edison Co.:

Southern California Edison Co. will launch its participation in the nationwide "Live Better . . . *Electrically*" program by conducting a series of 58 "grass-roots" meetings for businessmen throughout its service territory during the week of Feb. 27.

The local meetings, to be held in each of the company's 30 districts, will be attended by approximately 2,500.

Businessmen at each of the meetings will watch a kinescope of the closed-circuit telecast and then the Edison company will present its localized program for helping these selling allies accelerate their marketing of electrical

"Everything about the national campaign is King Size. It's up to all of us to make the local promotion just as big and dramatic."

—Frank M. Warren, Jr., president, Portland General Electric Co.

"We contractors welcome this chance to be partners in this industry-wide drive to electrify the home."

—Earl Peak, Central Electric Co., San Francisco and Palo Alto

goods and services in residential areas. The businessmen will be shown how they can tie in their merchandising efforts with the company's broad program of selling the benefits of increased electrification to home owners.

C. W. Brissenden, sales manager, Portland General Electric Co.:

We have had one meeting with Pacific Power & Light Co., the closed-circuit telecast luncheon, attended by some 200. Virtually all of the allied trades, suppliers, contractors, dealers were represented. It is difficult to evaluate reaction to the program but I would say it was favorable. There seemed to be general agreement to make use of the promotional theme.

Actually we are not planning an appreciable change in our promotional program. We already have been on the ball with our adequate-wiring promotion and now our tie-in of adequate wiring with the water heater pitch. We have been stepping up our load-building promotion after five or six years of almost exclusive institutional advertising because of tight power supply. Availability of kilowatts is assured through 1960.

We haven't any target, frankly. We are already past the point which the rest of the nation would like to hit in 1970. Our peaks and averages have been setting new records each year—above our estimated figures. We've just about given up setting goals.

Al Gilbert, sales manager, Idaho Power Co.:

Reaction to the TV closed-circuit meeting was thrilling, beyond anyone's expectation. Six meetings will be presented throughout our area, using the kinescope.

We knew in advance of the program and already have incorporated it into our 1956 promotion. Therefore, we will make no basic change. Nevertheless, we feel it is a splendid addition to the industry effort.

We have ordered the 50-second spots, will use the spots and radio plugs on our already sponsored TV home theater and various radio programs.

Our target for 1960 is 8,000 kwh, an increase of 2,000 kwh, which is expected to bring $28,000,000 in appliance and wiring business.

Don Willis, vice-president in charge of sales, Arizona Public Service Co.:

We will participate with Appliance Merchandisers Assn. and Salt River Valley Power District in three-way sponsorship; have planned one big meeting on March 7. The power district will have six meetings and Public Service will have about 15 meetings throughout Arizona.

No changes are contemplated in our promotional program other than expansion as needed. Just how the program will be used to sell the consumer will not be determined until after the March 7 meeting.

Arizona Public Service is now averaging 2,700 kwh a year with heavy demand in summer because of cooling operation and lighter demand in winter. The company expects to pick up about 1,200 by 1960.

W. F. Chapman, commercial manager, San Diego Gas & Electric Co.:

Six regional meetings will be used to present the program to the industry throughout the county. Response was enthusiastic to the TV closed-circuit meeting. Bankers, builders and others seem to welcome anything to keep the sales ball rolling. I sat in the audience, not at the speakers' table, and those people were really anxious to cooperate.

San Diego Gas and Electric Co. will slant its entire promotional program to the "Live Better . . . *Electrically*" operation. Our visual education department will use the film, *Meet Mrs. Swenson*, probably 50 times before service clubs and school groups if it's as good as they say. All radio, TV and newspaper space will be angled into the program. The suggested TV and radio spots will be used on the utility's regularly purchased time.

Average residential consumption in 1955 was 2,577 kwh. For 1956 the target is 2,663; for 1960, 3,000 kwh.

W. A. Huckins, manager, business development department, Utah Power & Light Co.:

We will hold about 25 meetings in our area and that of our subsidiary, Western Colorado Power Co., approaching two levels—wholesalers, distributers and retailers. About 280 attended the closed-circuit TV program, which was sponsored by Intermountain Electrical Assn., and was received with great interest.

Since 1939 Utah Power & Light has sponsored its own program (for the past three years, "Be Modern . . . Live Electrically"). It will not change this but will emphasize the approach to members of the community who handle appliance financing. It will also hold meetings with employees and wholesaler-retailer groups.

Target is 5,000 kwh average for each home by 1960. By 1955 the company has reached 3,780 kwh per home. Figures in the national program are based for areas where there is little or no competition. Also there's a big difference in appliances. A $150 water heater, for example, will use 3,600 kwh annually but a $250 TV set uses only 300 kwh a year. Obviously it's better from the utility standpoint to emphasize water heaters. Last year the average UP&L customer consumed 240 kwh daily; the national objective is 400 kwh. UP&L anticipates that $32,500,000 worth of appliances will be sold in its service area during 1956; has no estimate on wiring.

Gordon F. DeFoe, general sales supervisor, Washington Water Power Co.:

WWP plans meetings in 20 separate communities in its service area for dealers, electrical contractors, newspaper and radio people. Reaction to the closed-circuit telecast was mixed. There was enthusiastic response from home builders and realtors, however, and architects have asked to show the film in organizational meetings.

The company contemplates no real change in promotion. It has for some time been promoting better wiring; will support "Live Better . . . *Electrically*" enthusiastically. It will encourage the dealer, electrical contractor, architect, home builder and banker to accept and promote the program.

Average residential consumption is expected to be approximately 9,000 kwh in 1960. In 1955, appliance and wiring business totaled about $40,000,000 and there has been a 10% increase in each of the past four years. The dollar volume by 1960 should reach between $55 and 60 million.

"You can count on us 100% to help put this theme across. The industry can't afford to fumble on a big play like this."

—Ernest D. Schettler, president IEA and Modern Electric Supply Co.

Dr. Oliver Whitby of SRI (standing) and author by Bank of America's ERMA panel

EDP—A Challenge

Everett S. Calhoun*

Stanford Research Institute
Menlo Park, Calif.

Electronic Data Processing (EDP) could revolutionize utility administrative functions. This article, written especially for top-level executives, suggests ways to get a program started, summarizes costs and describes capabilities and limitations of various EDP systems . . . *The Editor*

Electronic data processing has become big business. It is big in every sense of the word. It is big because of the magnitude of the research and manufacturing effort necessary to produce the complicated equipment. It is big because of the very large acquisition cost and installation expense extending over a period of years. And only big businesses, or those with large clerical staffs, can now afford it. Although businesses seeking relief from staggering clerical costs expect the benefits of electronic data processing to outweigh its costs, this has not yet been proved. The stakes are high—making the investigation of office automation a matter worthy of the attention of top management.

Management's interest in electronic data processing, or EDP as it is usually referred to by its manufacturers, is evidenced by the record attendance at the countless conferences and association meetings throughout the country on office automation. Rosters reveal that officers of top U. S. businesses are taking part. A conclusion almost universally reached by those participating in these conferences is that no quick method has been discovered for intelligently installing EDP.

Time Requirements

The first firms to initiate serious studies for the evaluation of EDP were in the utility, insurance and financial fields, sometimes known as the "paper-pushing businesses." Several of the largest organizations in each of these fields commenced these studies shortly before the first EDP computer system was announced.† Although these studies have continued unceasingly with full-time staffs, it is significant that none has yet accomplished full utilization of EDP.

Top management of firms contemplating a program of applying EDP methods can profit by the experience of these pioneers. They found that a preparation period of two to five years is required prior to installation, and it appears that a similar length of time will follow the physical installation of the equipment before the system will be in total operation at optimum efficiency. Naturally, these time periods may be reduced as experience is acquired but no appreciable relief can be expected during the next few years. A realistic schedule for the installation of EDP should include these steps:

1. *Form an EDP systems group.* Assign several of the members on a full-time basis. The leader should be an officer of the company. All clerical functions of the business should be represented. The systems group should attend computer programming courses, become familiar with EDP and investigate installations of EDP in similar businesses.

2. *Make detailed flow charts* of present procedures. Establish the ideal information flow from input to output of the applications being considered. Isolate checking procedures and any unnecessary duplications.

3. *Outline an ideal EDP system* for a hypothetical computing machine. Identify best applications, desirable new methods, policy changes, etc.

4. *Investigate available EDP equipment* and secure bids from manufacturers on systems suitable for requirements of applications identified in Step 3, above.

5. *Evaluate bids* received on the basis of (a) ability of equipment to complete procedures in time limits specified; (b)

* Mr. Calhoun is manager, electronic data processing, Economic Research Division of SRI.

† The first electronic computer designed for business data processing was the UNIVAC which was first operated in Philadelphia in 1951.

comparison of economic savings resulting if equipment is purchased or leased; (c) magnitude of programming effort required; (d) ability of manufacturer to deliver complete system within specified time periods and to provide adequate maintenance service and installation assistance. Place order for equipment.

6. *Organize and train a computer programming group* while awaiting delivery of the equipment. Diagram and program the system for the principal applications identified in Step 3, above. Debug and test these programs on service bureau machines. Institute necessary policy changes and methods.

7. *Accept delivery of equipment.* Test and apply programs to actual data on duplicate test basis. Gradually replace manual procedures and study additional applications.

8. *Perfect computer programs and systems* on primary applications and write programs on new applications. Utilize EDP equipment until expected economies are realized.

It is improbable that any firm making its first effort will accomplish any one of these steps in less than six months unless considerable outside professional assistance is engaged. It would, however, be incorrect to assume that any research organization, even though skilled in computer applications, could accomplish this task alone. Successful results require active cooperation between a company's management and experienced data-processing analysts. Even with this ideal combination, completion of the eight steps outlined above in any normally complicated business would probably take at least four years.

Benefits of EDP

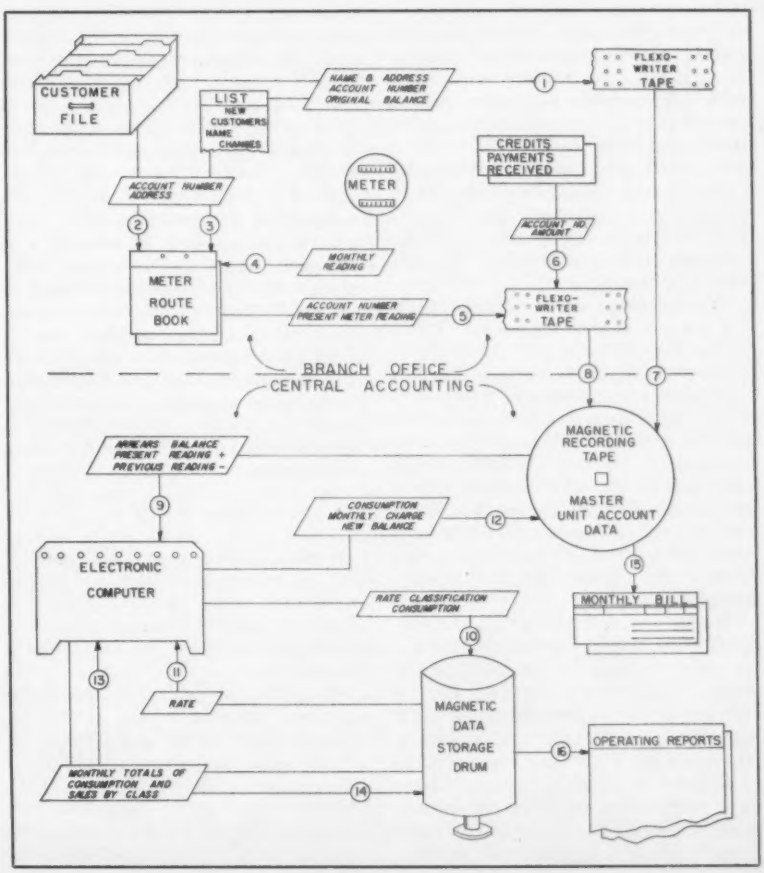
Considerable publicity has been given to the labor-saving benefits of automation. A number of firms expect to replace as many as 100 to 200 clerks when their installations of large-scale EDP systems are completed. It is erroneous, however, to consider labor saving as the only benefit of office automation. Additional benefits which may far outshadow that of reduced clerical costs are: (1) more timely information for management; (2) condensed reporting of information; (3) new information for management; (4) system streamlining; and (5) engineering calculations.

1. *More timely information for management.* Electronic computers can record and compare thousands of related figures and calculate the percentages of increase or decrease in a few minutes. In fact, some computers will handle thousands of computations per second. This characteristic speed of electronics permits reporting on a current basis without the delays inherent in manual clerical processing. As an example, many business executives have resigned themselves to receiving a profit and loss statement and operating report once a month, usually two weeks late. By the proper use of electronic data storage systems, such reports can be made available on almost instant notice, compiled and prepared automatically in any degree of completeness requested.

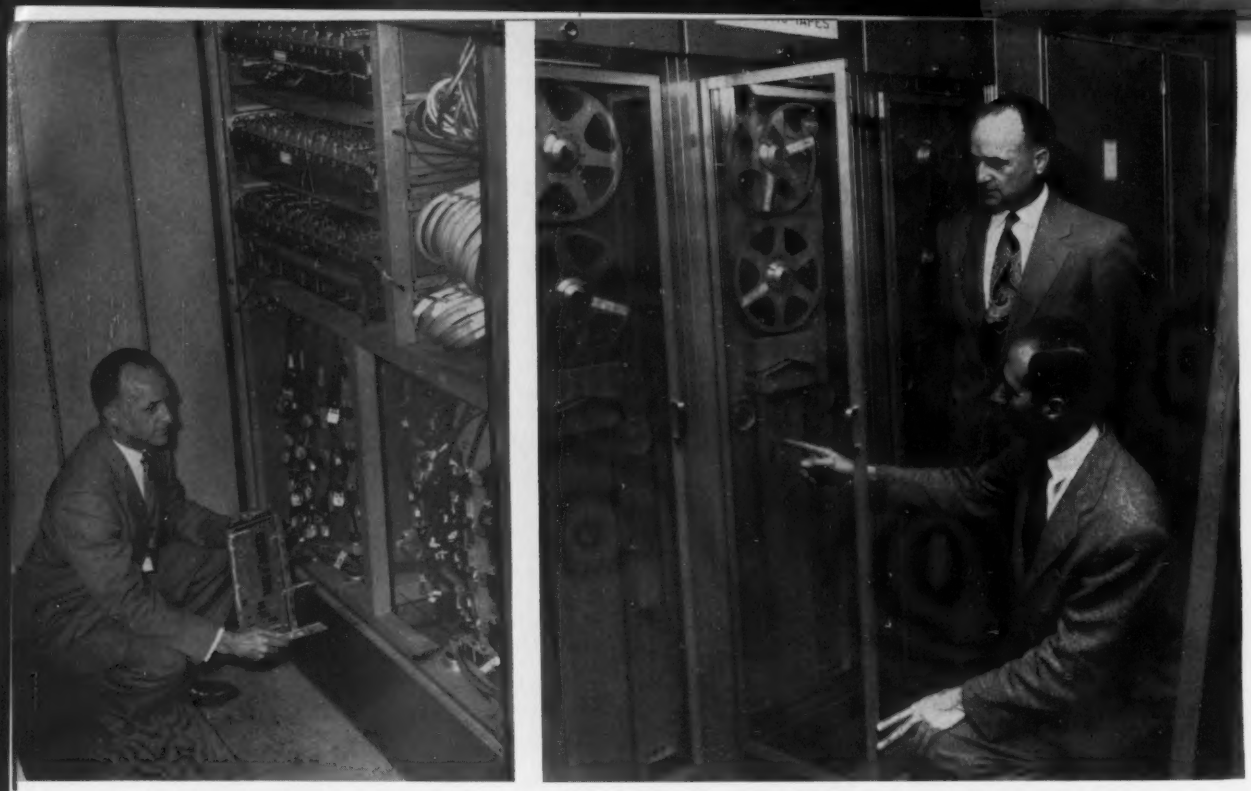
2. *Condensed reporting of information.* Not generally appreciated is the ability of electronic computers to analyze and edit vast amounts of data so that it is more understandable when reported. For instance, computers can be programmed to nonprint all items of an operating report which are within a normal range, reporting only those which are above or below specified variations from standard. The standard figure of comparison might be based on budget, quota, average or previous history. In this way, condensed, easily digested reports, issued currently, may offer infinitely more guidance to the executive than the present voluminous reports received so late they are often of little value. Nearly every fact contained in condensed reports will be worthy of executive action.

3. *New information for management.* Due to high clerical costs many businesses forego the recording of statistics known to be desirable. With an EDP system it is practical to do many statistical jobs that have been left undone. Experience indicates that as soon as management realizes information is available it wants more information. As an example, it is reasonably straightforward and simple to apply electronic computers to the problem of maintaining inventory balances in a material control application. Orders placed, goods received and stock issued can be easily recorded, perhaps as a by-product of producing the purchase orders, accounts payable receiving reports and material requisitions.

With the high capability of electronic computers, it would be in order to re-examine the basic rules under which the inventory is controlled: balancing the costs of a plentiful stock position, including warehousing, interest, depreciation and obsolescence with the cost of too little stock, such as back



This is a suggested flow chart using an electronic accounting system for utility billing



At left, the author holds a printed circuit plug-in unit and looks at two magnetic storage drums. At right is ERMA's tape storage

orders, lost business, excessive purchase orders, etc. Mathematical formulas can be derived that combine these facts with procurement lead-time, present rate of issue, future predicted requirements and price trends. This results in a scientifically computed ordering cycle for each item. Computers can be programmed to perform these calculations in fractions of a second, but developing the mathematical formula may take months.

Formulating rules for decision making is a new science known as "Operations Research." Nearly all data-processing applications have possible refinements over present procedures which offer attractive savings, but the specialists who understand the new techniques are few. Systems groups may require time to take study courses in this new science. Therefore, the desire of management to achieve the ultimate from an EDP installation may appreciably lengthen the time requirements.

4. *System streamlining.* A surprise additional benefit has resulted from a number of recent investigations of the economic feasibility of EDP. During the systems study preceding the EDP installation a detailed and searching re-examination of established procedures and company policies takes place. The importance of information and reports is established and the desirability of additional data becomes evident. This may lead to a streamlining of procedures, elimination of needless forms and centralization of clerical functions that will bring economic benefits even if EDP machines are never installed.

5. *Engineering calculations.* Utilities (and other organizations with engineering departments) may realize still another benefit from the use of the electronic computer for engineering calculations. For example, utility engineers might calculate the scheduling of the power network faster and more accurately. Little experience exists in this application of computers, but engineering use of the computer portion of an EDP installation in its spare time may demonstrate its value. It may then prove to be economical to purchase one of the smaller scientific computers ($20,000 to $50,000) for engineering work alone.

Cost of EDP

Firms considering an EDP installation are frequently unprepared for the high initial costs of the equipment. Machines described as electronic computers vary in price from $25,000 to $2,500,000.

A method or rule for classifying electronic data-processing systems is needed. A frequently used subdivision is (1) small scale—under $200,000; (2) medium scale—$200,000 to $800,000; (3) large scale—over $800,000. The groupings do not adequately provide for the recently released desk-size electronic computers, priced from $20,000 to $50,000, or for the giants priced at more than $1,500,000. These might be called very-small scale and very-large scale. Following recent announcements that space requirements of new very-large systems will total 10,000 to 20,000 sq ft, it has been suggested that they be classified as "quarter-acre" or "half-acre" models.

Most EDP publicity concentrates on the computer, or "giant brain" as it is frequently called, because it is spectacular. The computer is actually only the mathematical and control center of a large system. Misunderstanding of the actual cost of EDP systems results from failure to realize that one-half or more of the total cost may be in accessory equipment supporting the electronic computer. Much of this is high-precision mechanical equipment, operating at exceptionally high speeds, and it is very costly.

The largest unit of accessory equipment in an EDP installation is the output device, usually a high-speed printer. Eight different machines are being offered by manufacturers to print data from magnetic tape files at speeds between 300 and 1,000 lines per second. A 1,000-line per minute wire-printer can exceed the production of 200 world-champion typists! The price range of these mechanical wonders is from $100,000 to $400,000 when fully equipped with the electronics and the control devices required on many applications, although the mechanical printing head alone may be quoted at $50,000 or less. Business management

must become familiar with the capabilities of the various printers and match them to the requirements of their applications if economic benefits of EDP are being sought.

Input equipment consists of adding machines, cash registers, typewriters and bookkeeping machines equipped with punches to perforate paper tape or cards. These devices convert the data entering a business into coded form when it is first recorded. The punch equipment usually adds at least $1,000 to the price of the machine. If a firm has a great many branches where data originate, the cost of input equipment may run into many thousands of dollars. Only a very careful analysis will prove whether it is cheaper to punch tapes or cards from all data at a central transcribing center or to supply each branch office with specialized input equipment.

Accessory EDP equipment also includes such machines as magnetic tape and other data-storage units. The electronic controls necessary for searching the memory units (to find specific items of stored data) are very complicated. One recent installation included 180 tape-handling devices priced at over $10,000 each.

To be considered also is the sizable costs of the cooling, air conditioning and power-regulating equipment, and the preparation of the site, all a part of an EDP installation. These are usually not obtainable as a part of a lease contract for the major computing equipment. These costs vary from $20,000 to $200,000 for medium or large systems, and the help of engineers is usually justified in making the decisions required.

In addition to the equipment cost, a very sizable expenditure must be budgeted for the system diagramming, computer programming and installation of an EDP system. These costs sometimes approximate 50 to 100% of the cost of the equipment, and consist principally of cash outlays for salary. Many man-years of skilled work are required for most EDP installations. A major part of the time is spent on programming, or writing the thousands of machine instructions for clerical procedures. These must be written in the minutest detail, and in the special language the computer understands. Selecting and training an adequate staff and supervising the activity is a responsibility of management.

Design Trends

It appears that a number of trends are gaining momentum in the various laboratories where new EDP equipment is designed. It is advisable for systems study groups to watch these trends carefully, as they may appreciably affect the usefulness of EDP in some businesses. These trends indicate a growing emphasis toward:

1. Complete integrated systems
2. Faster, smaller computers
3. Data storage and information files
4. Special-purpose EDP systems

1. *Completely integrated data-processing systems*†† are the goal of each manufacturer of EDP equipment. Less interest is being shown in isolated pieces of electronic hardware than formerly. Designers now recognize that each new device must be compatible with other parts of a system in order to be completely effective.

2. *Faster, smaller computers* are of particular interest. The tiny transistor, invented only four years ago, is already being used in computers to replace vacuum tubes. Transistors affect marked reductions in the space requirements and power consumption of computers, and practically eliminate the need for air conditioning. Thus they are of very real interest to the potential purchasers of EDP systems. Magnetic data storage drums, a part of nearly every EDP computer, are being designed with storage densities as high as 5,000 characters per square inch, permitting significant reductions in size. Some manufacturers are contemplating the complete elimination of the magnetic drum by the use of tiny magnetic cores, effecting still greater reduction in size.

3. *Data storage and information files* are being increased in capacity to meet the needs of business applications. Several new systems are nearing completion which will store 5,000,000 characters of information, or digits, on multiple magnetic drums or disks. Items of data can be recorded or printed out in a second or less from any portion of the file. More importantly, data can be entered into the file without the preliminary sorting that is necessary with punched cards or even magnetic tape.

The volume of sorting and collating of data in modern accounting applications is so great that, on some common applications, sorting alone requires half of the available computer time. Development of special file maintenance devices is thoroughly justified. Several new systems include a special electronic "file processor" for sorting and collating, which releases the costly computer for more complicated operations.

4. *Special-purpose EDP systems* are proving their worth on high-volume applications. Most of the electronic computers built since 1948 have been of the general-purpose type. That is, they could be programmed to perform a wide variety of data-processing applications. Partly due to the high cost of these machines, and partly to the cost of programming them, there is considerable interest in special-purpose machines. These machines are built (rather than programmed) to automatically perform a few limited functions at high speed.

One of the largest special-purpose EDP machines built so far is ERMA (Electronic Recording Machine, Accounting), designed at Stanford Research Institute for the Bank of America. ERMA will do all the bookkeeping for 50,000 commercial checking accounts. Data is stored on magnetic drums and tapes. At the end of the month statements are automatically produced on high-speed printers.

The trend toward special-purpose EDP systems will be of particular significance where a single large application exists in a number of different businesses, or where any one business has a great many branches with identical problems.

In conclusion it would appear that the challenge of EDP to the managements of big business firms is very real. There are many actions that can and should be initiated now if full advantage of the advanced models is to be gained. Because of the many man-years of work involved in an EDP installation, a business hoping to be in a favorable competitive position as to its clerical costs by 1960 should start its investigation now.

The success of an installation of EDP is not a foregone conclusion. Actual losses (higher total cost than present clerical costs) may result from a number of wrong decisions. Serious errors in designing the system, inaccuracies in programming, or selection of inadequate or too costly equipment could cause disastrous losses. On the other hand, attractive economic benefits appear to be attainable with presently available equipment if the applications are carefully selected and planned.

If a business decides to study the feasibility of EDP, its management must budget adequate funds for the program, release personnel for a systems study group, initiate an educational course and engage professional assistance during the early stages at least. An officer or management representative should direct the program. Assuring that the benefits outweigh the costs challenges management to give its best effort to a study of EDP.

†† *Integrated data processing* means that the data entering a business system is quickly arranged in coded form, preferably as a by-product of the first handling of the information. A method of communication is provided for transmitting this coded data from within the system to the central processing station, where it is automatically computed. Following rearrangement and collating of the new data with existing information files, the results are either placed in accessible storage files or printed out on required output forms. Thus, all data remains in coded form from input to output.

Southern Nevada Power Co.'s new 44-mw semioutdoor station located near Las Vegas, Nev. Already a 66-mw second unit is being added

Nevada's First Steam Station

D. D. Smalley, Vice-President and Operating Manager, Southern Nevada Power Co., Las Vegas

Clark Station, officially dedicated as a part of the Southern Nevada Power Co. on Feb. 24, 1956, is noteworthy for two reasons. It is the first steam-electric central station in Nevada; it is located almost literally in the shadow of Hoover Dam, first of the large federal hydro power projects. Situated 10 miles from the famous Las Vegas strip, this new, semioutdoor station presents a startling and colorful contrast to its desert surroundings. Its main external colors are deep turquoise, suede, rose buff and aluminum. Foam green and peach are dominant in the interior. In all, 38 separate colors have been used for color coding, protection, safety and beautification.

The first unit of Clark Station is rated at 44,000 kw. It cost about $6,500,000 and was completed in approximately 14 months under the direction of Stearns-Roger, engineers and constructors, and went into operation in December 1955. Now under construction is a 60,000-kw reheat unit which will be completed in April 1956.

The plant is designed to use a minimum of operating personnel. Three men per shift are presently required for operation ; namely, a shift foreman, a control room operator and an auxiliary operator. When the second unit is placed in operation, only one more auxiliary operator per shift will be required. A semioutdoor design is used with the boiler entirely outdoors. The building is constructed of cinder block, its architectural appearance in keeping with the architecture in the Las Vegas area. The height of the operating floor above the condenser floor is 22 ft. The turbine foundation is of the two-legged, T type with the condenser parallel to the axis of the turbine-generator.

The turbine-generator is installed in a cinder block house with removable hatch covers in the roof and served by a 30-ton gantry crane. A separate structure on the operating deck houses the control room and the shift foreman's office. The generator, H.P. feedwater heaters, evaporator and air ejector are located outdoors on the operating deck.

Inside the main building are offices, dispatcher's room, shop, battery room, and the electrical equipment and plant auxiliaries. The entire building, other than the mechanically air conditioned office and control room areas, is cooled by washed air. A slight pressure is maintained to minimize the infiltration of dust. As freezing conditions sometimes occur, the instrument air is dried to remove moisture and vital control lines are traced with electric heating cable.

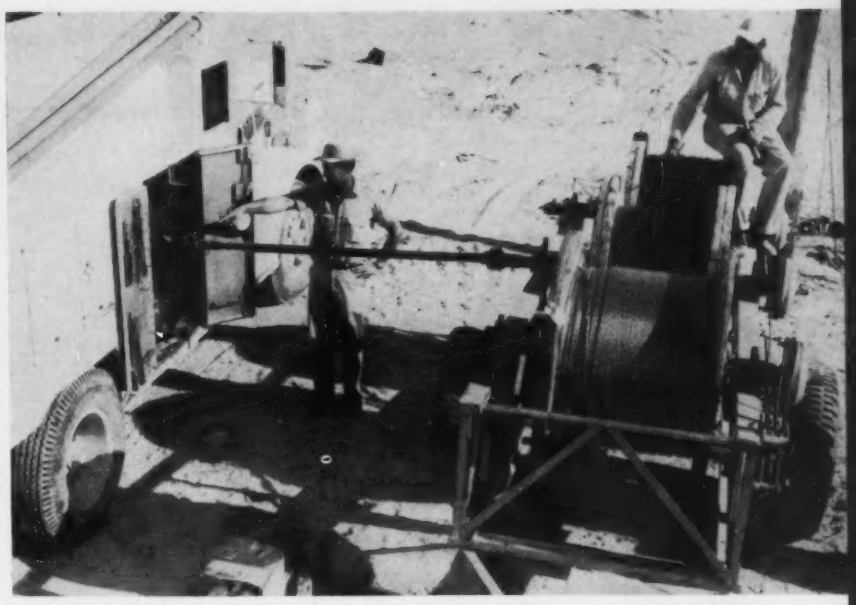
Unit No. 1 is a 44,000-kw, ASME-AIEE Preferred Standard General Electric turbine-generator. The throttle conditions are 1250 psig, 950 F TT. The turbine has five extraction points. The generator voltage is 13.8 kv with a design output of 58.8 mva at 30-psi hydrogen. Excitation is provided by a 165-kw direct-connected exciter. A Riley radiant-type steam generator with a pressurized furnace, economizer and regenerative air preheater serves the unit. It has a maximum continuous capacity of 425,000 lb of steam per hour.

The condenser is a Westinghouse two-pass, nondivided water-box type with a total surface of 37,500 sq ft. Condensate is taken from the hotwell by vertical pit-type condensate pumps through the air ejector and two low-pressure feedwater heaters into a vertical tray-type deaerator. There is approximately seven minutes water stor-

age in the deaerator at design capacity. An evaporator is utilized for boiler make-up.

Natural gas and fuel oil are used and they can be burned separately or simultaneously. The oil burners are of the Peabody return-flow type and utilize a constant differential pump. Fuel oil must be brought in from California in insulated trucks and trailers as there is no plant railroad spur. Oil storage for approximately 30 days has been provided for the first unit.

Cooling water is supplied by means of a Marley induced draft cooling tower. The two circulating water pumps are of the horizontal type and are sized for half capacity. Make-up water to the system is supplied from two wells 1,000 ft deep but the plant has an emergency connection with a water line supplying the city of Las Vegas with Lake Meade water. Effluent from a new sewage treating plant for the county being built nearby is being considered as a future source of cooling water make-up.



Several transmission lines were built to distribute power from new Clark steam plant

Electrical System

Isolated-phase bus duct is used to solidly connect the generator to the 60,000-kva, forced-oil, air-cooled transformer, with line switching being accomplished on the 69-kv side. A direct take-off from the bus duct connects to a cabinet which houses the surge protection equipment, generator potential transformers and neutral grounding transformer. A disconnect switch built as an integral part of the bus duct allows take-off to the normal source, 3,000/3,750-kva auxiliary power transformer.

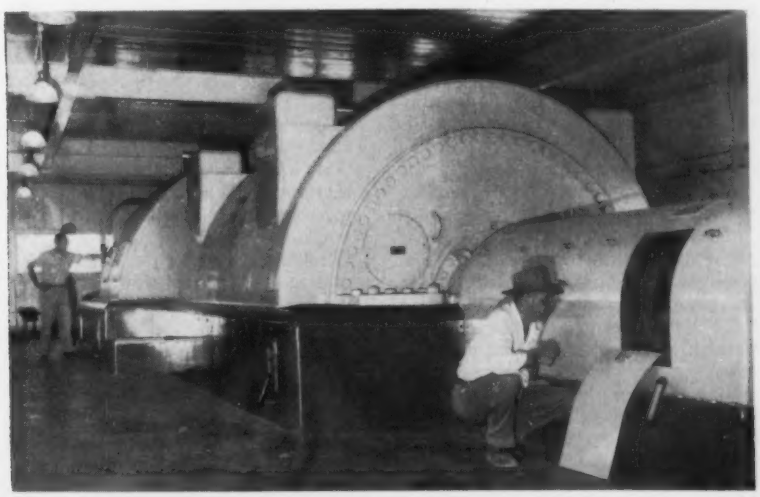
Auxiliary power is obtained from the 2.4-kv switchgear by normal and start-up solidly grounded wye circuits. Transfer from the normal to start-up source is automatic in the event of operation of the generator protective relaying.

Auxiliary Power

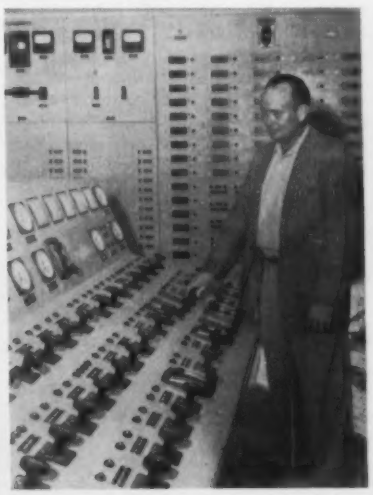
Motors of 150 hp and larger are 2,400 v, and are fed directly from the switchgear. The 480-v auxiliary power is furnished by a 1,000-kva load center-type indoor transformer and motor control centers.

Operating controls for the boiler, turbine, their auxiliaries, and generator are located on a console or bench-type panel. On the front and rear panels of a vertical walk-in type of panel are mounted the boiler recorders, turbine supervisory instruments, generator recording instruments and the automatic control panel for the soot-blowers. The control room will be extended for the second unit, thus one operator will be able to operate both units of Clark station.

A complete dispatcher's room is set up for system operation. Control of the local 13-bay, 69-kv and future 4-bay, 138-kv switchyards, together with several remote system substations, is effected from this room. Remote substation control is accomplished by use of microwave and pilot wire circuits.



Cinder block structure houses first unit. Roof hatches provide access to the equipment



Only three men per shift operate the plant

Man-Made Weather Possible

Meteorologists confirm precipitation increases ranging from 9% to 17%

Cloud seeding by means of the commercial technique which involves releasing into the atmosphere silver iodide smoke from ground generators produces results which are not spectacular or breath-taking but which can be very important to the water economy of the nation. This conclusion has been reached and reported to the President (Feb. 9) in an interim report by the Advisory Committee on Weather Control after three years' study and evaluation of cloud seeding experiments, mostly on the Pacific Coast.

The committee staff's statistical evalutions showed that five out of six cloud seeding projects produced increases in precipitation from 9% to 17%. The other project produced an inconclusive result. However, an evaluation completed after approval of the interim report shows an increase of higher percentages than those cited. Other projects give promise of showing results of the magnitude cited.

The committee staff selected for study first the commercial cloud seeding projects carried out in the Pacific Coast states (mostly by private electric utilities—Editor) because it felt, on physical grounds, that these should produce the most easily recognizable results. The committee can say very little about the efficacy of cloud seeding in other areas and asks for a two-year extension so it can investigate.

Skeptics are answered by this statement by the committee: "We are confident that the methods of analysis adopted by our staff represent a significant advance in increasing the sensitivity and reliability of statistical tests in evaluating weather modification projects . . . The advisory committee's staff has produced the first series of evaluations showing positive results."

Excerpts from the report bring out other important related facts as follows:

Can cloud seeding suppress or reduce rain, as well as increase it?

"The committee has heard many stories and theories about this but it has not seen convincing evidence that cloud seeding can or accidentally might suppress or reduce rain. However, the question must remain open until we get much more information."

Can cloud seeding suppress hail?

"This is one of the most hopeful prospects for cloud seeding. The committee's staff has analyzed, statistically, a project in Switzerland, carefully conducted under scientific auspices, and the analysis shows a 50% reduction in hail . . . The staff's belief in the theoretical possibilities is great enough to warrant the closest interest in commercial hail-suppression projects and a federal investment in public experiments to find out more about the subject."

Can cloud seeding inhibit lightning?

"The severe storm conditions which produce hail are often those which produce lightning. Very possibly the same 'tonic' for stopping hail can also stop lightning. Lightning, of course, is one of two principal causes of forest fires and, understanding this, the Department of Agriculture has initiated an experiment in Idaho and Montana called 'Project Skyfires.' The advisory committee on weather control expects to cooperate with the group carrying out this project and support it as best it can."

Can cloud seeding prevent tornadoes?

"Success in suppressing hail would indicate possible success in modifying tornadoes. However, this must certainly be some time in the future and the economics of setting up a cloud seeding network for this purpose has not even been considered."

Does the federal government regulate cloud seeders?

"The federal government does not 'regulate' cloud seeders but the law creating the advisory committee on weather control specifies that they shall submit reports (monthly) on their operations—so that the government, through the advisory committee, can keep track of and evaluate their operations in the public interest. The committee does not now recommend that the federal government regulate the cloud seeders."

"**On the operational level,** radar offers an inspiring prospect. As present-day commercial operations are conducted, no one can see what he is doing because of the distance between generators and the areas of effect and because of the fact that seeders customarily operate when visibility is bad, i.e., during storm situations. But radar sees through clouds so that operators can detect approaching 'seedable' storm cells and can also find out when they are successful in creating effects and when they are not, which information leads them to adopt improved techniques. It gives them a tool for finding out what they are doing.

"**On a broader level,** it appears that we may be on the verge of developments which may significantly advance the field. For instance, studies are going forward on the use of a new and promising chemical as a substitute for silver iodide. And, a new and completely different technique has been experimented with briefly.

"**The federal government is in a position to promote and accelerate developments** which may prove of commanding importance to every citizen. It can do this by (a) continued surveillance and evaluation of efforts in the field; (b) carrying out practical experiments to improve presently known techniques; and (c) encouraging and supporting basic research. The committee's interim report advocates a research effort on a much greater scale than at present."

Proposed Two-Year Program

"The committee, in accordance with a resolution adopted at its meeting on Jan. 10, 1956, has recommended that its life be extended for two years. In anticipation of concluding its assignment within that period, it intends to bring as near completion as possible the following undertakings.

"1. Continue statistical evaluations of seeding projects using all hitherto unprocessed data up to June 30, 1956, and current data from commercial seeding.

"2. Endeavor to find common meteorological factors in commercial operations that yield outstanding statistical results either by themselves or within storm types.

"3. Stimulate and encourage competent basic research aimed at obtaining a better understanding of the precipitation process.

"4. Obtain as much reliable information as possible regarding the practicability of methods for suppressing lightning and hail.

"5. Make continuing studies of commercial seeding operations in the Pacific Coast area to learn more about the effects of orography on precipitation.

"6. Determine the frequency of situations in a given region that may be favorable to seeding."

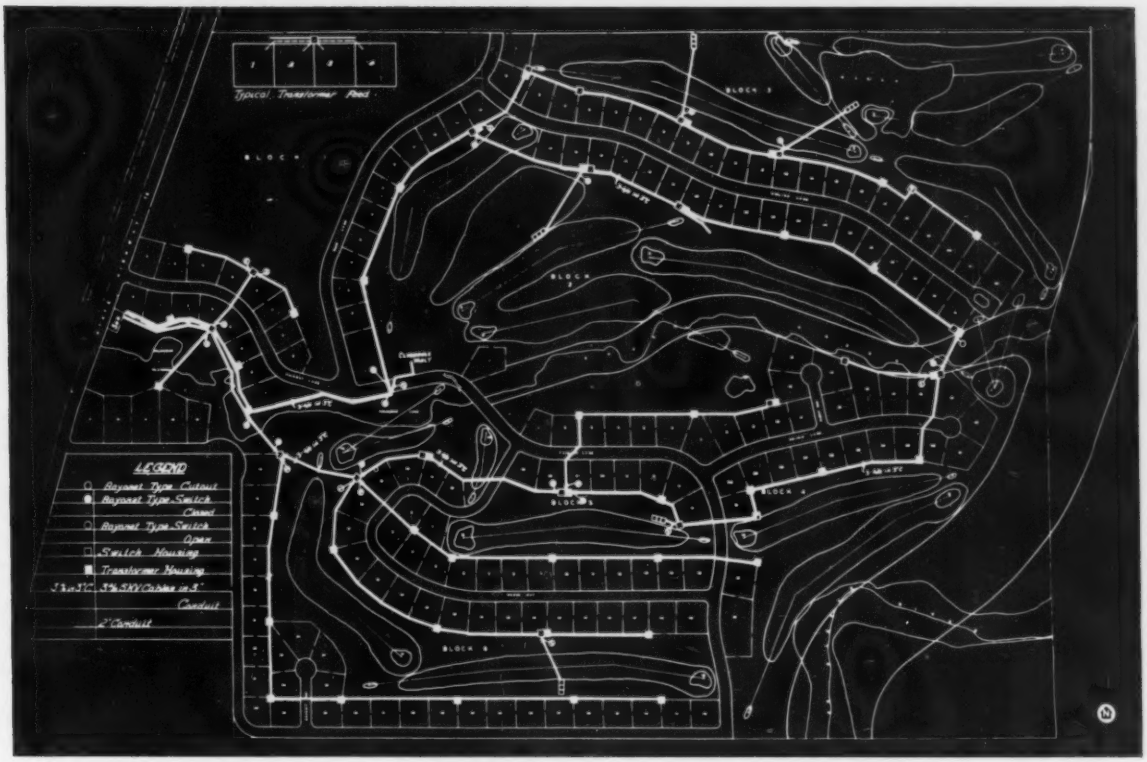


Fig. 1—Underground system layout showing 4-kv primary cable loop in 3-in. conduit and location of switch and transformer housings

Colorado Central Power Co. develops new design for

Residential Underground Service

Howard S. Smith, Colorado Central Power Co.
H. C. Oliver, Collier Electric Co., Denver

Utilities are confronted, with increasing frequency, with a request for an adequate, safe, pleasant-appearing underground power system to serve residential areas. The Colorado Central Power Co., in collaboration with Collier Electric Co. of Denver, has made a new approach to such a system for the Columbine Valley Estates south of Littleton, Colo.

The area served is a subdivision with a golf course intermingled and in general adjoining the rear property lines of the lots (see Fig. 1). The sewer, gas and water systems were planned to run in the street. To eliminate confusion and possible damage when the customer tapped his utilities, it was decided to place the electric and telephone utilities to the rear of the property adjoining the golf course. The lots have considerable frontage; therefore transformer spacing became such that banked secondary could not be justified. For the most economical form of service distribution, one 2-in. conduit was installed just inside the properties adjoining the transformer housing and into the properties bounding the two aforementioned properties (see insert in Fig. 1). The telephone company has utilized the same system of distribution, installing a combination pull-termination box on the side of the transformer housing (see typical transformer feed insert in Fig. 2). The primary system consists of a three-phase, 4/0, 2,400/4,160-v wye loop laid in 3-in. conduit. Laterals are taken off and sectionalized wherever possible so they may be fed from either end of the loop in case trouble develops in any section of the loop. Service can be restored to any transformer tapped on the 4/0 loop by removing the faulted cable from the termination pads and reclosing the proper switches.

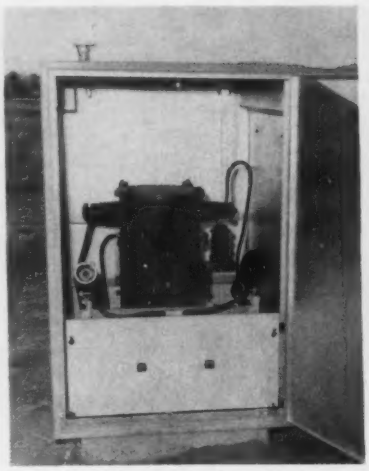
CSP transformers with arresters were selected for the service. Transformers located at the far end of primary spurs, however, are equipped with the lightning arresters.

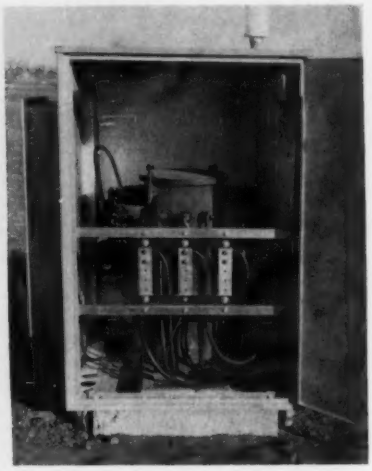
Considerable thought was given to the type of transformer enclosure em-

ployed as it was felt that the transformer enclosure should also serve as a pull-termination box for the 4/0 loop and as a switching enclosure where required. The solution to these problems came with the use of small switchgear-type enclosures that could be readily joined together to make either a double or a triple housing. See Figs. 2, 3, 4, 5 and 6.

The electrical components of the system were designed for a 10-kva undiversified demand per customer plus about 600 kva of pump and clubhouse load. The 5-kv unshielded butyl rubber insulated cable with a protective neoprene jacket was selected in preference to 5-kv shielded cable because of the decreased cost of cable and cable terminations. With normal life expectancy the 5-kv unshielded cable should last until the system is ready for a change of capacity with only minor replacements.

A problem that plagues the utility design engineer is "what will happen if a short circuit occurs?" To satisfy the curiosity of the engineers both from Collier Electric Co. and Colorado Central Power Co., a short-circuit test was arranged and the following conditions imposed upon the system. A three-phase short circuit was placed in a transformer housing one cable run past three fused bayonet-type cutouts in a switch housing. The cutouts were fused and the station recloser closed. The impact of the fuse blowing caused a slight temporary expansion of the housing with considerable smoke escaping from the vented and crackage areas. It is the feeling of the authors who were both present that the housing and bayonet-type cutouts may be used where the short circuit is considerably greater than the 2,000 amp that were successfully interrupted by the test in question. When the doors were opened there was no apparent damage to the transite barriers with very slight arcing to the sides of the transformer housing, which was anticipated.





Figs. 3 and 4—Primary side of transformer housing (view at left) showing 4-kv bayonet-type cutouts as well as the bayonet-type sectionalizing switch. View at right: This is the secondary side of transformer housing showing terminal strips for service taps

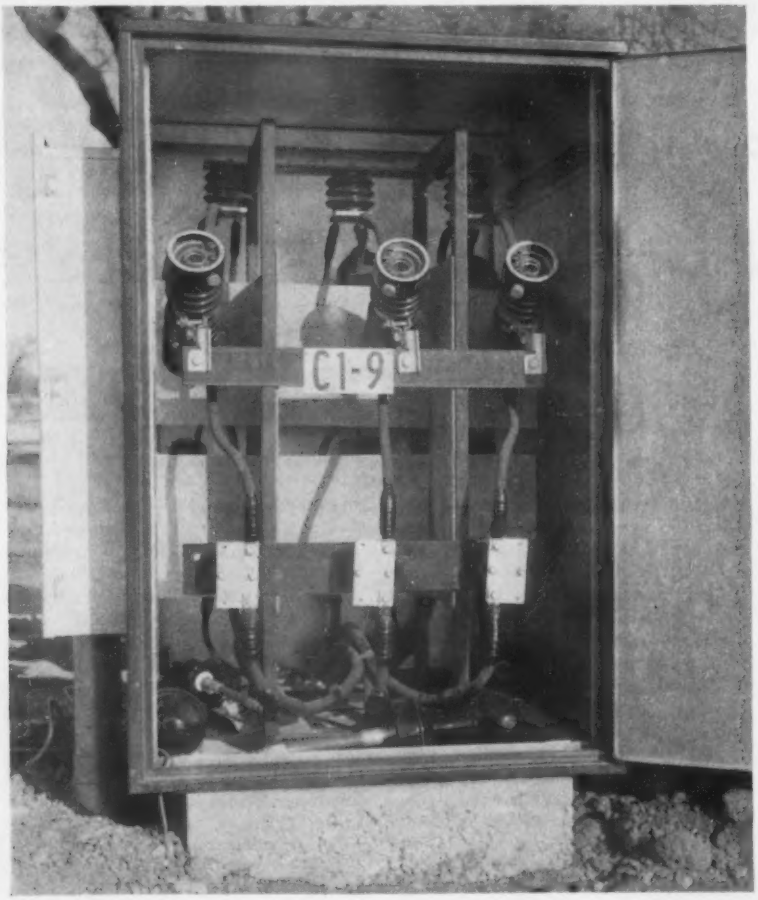
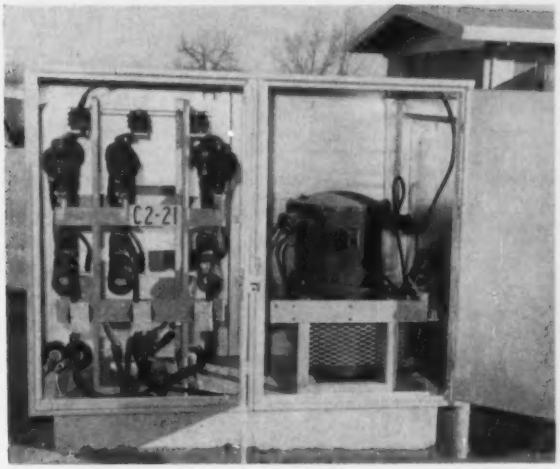


Fig. 2—Switchgear cubicle for 4-kv primary with bayonet-type switch rack mounted on the top arm. Notice telephone terminal box mounted outside on the left side of cabinet

With the transformer above ground, with adequate venting and with one coat of aluminum paint on the interior to reflect the intense heat from the sun realized at higher altitudes, the transformer size required should be no greater then installed in a transformer housing as compared to pole mounting. With the transformer and cable terminations 100% above ground, troubles realized from faulty cable terminations and those occurring from moisture within the transformer should be reduced to a minimum. There is a possibility of considerable ground water in this area due to its proximity to the Platte River.

The wiring code at Columbine Valley Estates requires that two 1/0 copper phase conductors with a No. 2 copper neutral be installed in 2-in. con-



Figs. 5 and 6—Two-compartment enclosure may be seen in view at left. The left-hand compartment contains equipment for primary switching and transformer protection. Right-hand compartment is the transformer section with secondary service rack. View at right shows field installation with telephone pull terminal cabinet on the side, photoelectric street lighting control on top

duit with 2-in. nonmetallic duct preferred. This will allow 5-hp starting on the longest anticipated service run with no objectionable drop if a 25-kva transformer is installed and will allow conduit space for larger service conductors if required at some future date.

The street lighting system consists of ornate hollow spun concrete standards controlled by individual photoelectric controls installed on the transformer housings. This system is used to mark road curves, intersections, etc., only and is not primarily intended for a complete street lighting installation.

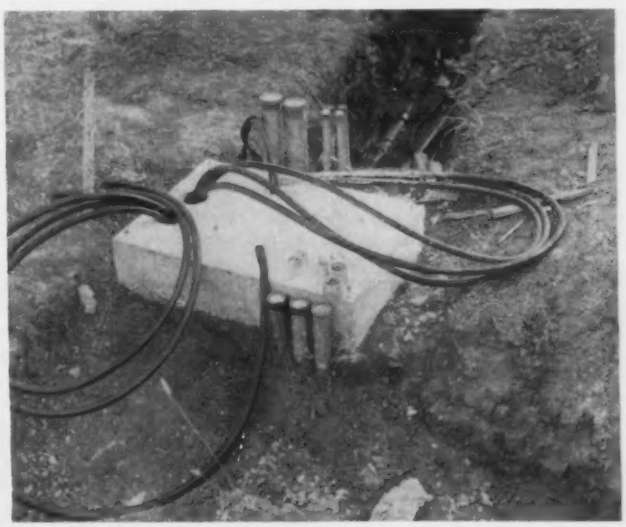
"How much did it cost?" is a question that is of prime importance. The following figures are the approximate costs of various items:

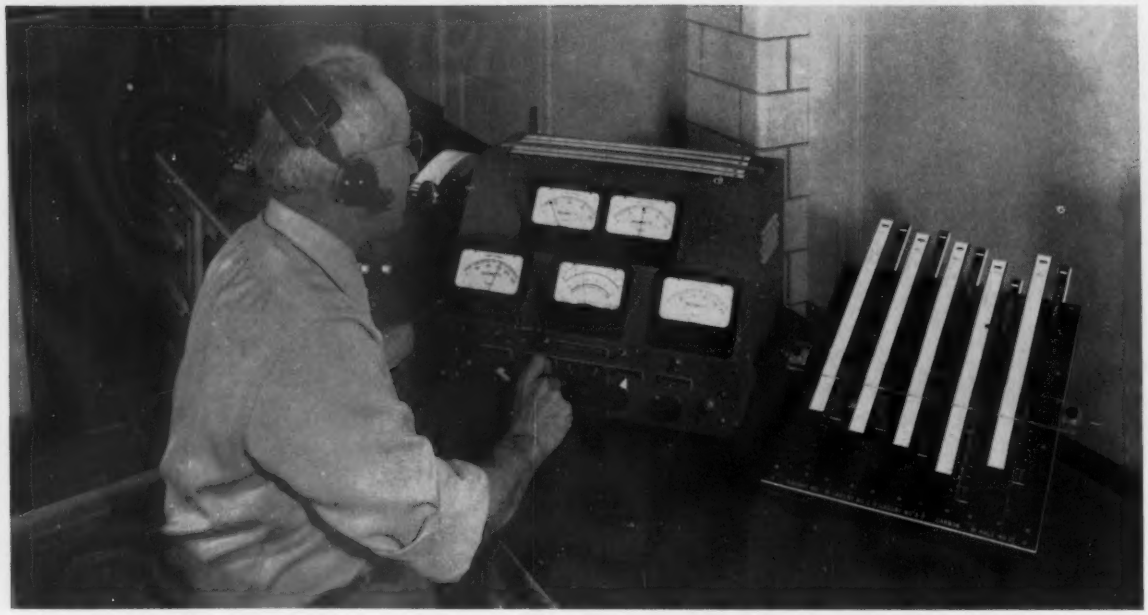
Cost per building site for electric service	$510
Cost per building site for telephone service	150
Cost per transformer housing installed, approximately	600
Cost ratio of underground electric system vs overhead system was	4.5 to 1

The cost ratio of the underground cost to the overhead cost is not a true comparison since the normal feed for this area would have been 7,620/13,200-v wye. If the equivalent estimated cost of a 4-kv system was used the cost ratio would have been considerably lower.

Conclusions: The system is in operation and is proving very satisfactory from a utility operational standpoint. Future designs will incorporate a scheme where the meter and a service pull box will be located on the side of the transformer housing; thus eliminating all high-voltage parts from access to electrical contractors when the service conductors are installed.

Fig. 7—Two stages in construction of new-type residential underground system built by Colorado Central Power Co. to serve new Columbine Country Club Estates. Left view shows primary and secondary conduits stubbed up for transformer platform. At right is concrete transformer pad





Analog penalty factor computer and incremental loading slide rule are necessary tools in the new load-frequency control system

Utah Power & Light solves interchange operating problems and economic loading with

A New Load-Frequency Installation

R. A. Radford

Electrical Engineer, Utah Power & Light Co.

Late in 1952 it was becoming very apparent that Utah Power & Light Co.'s existing load control installation (installed in 1941), together with the generating equipment under control, was inadequate to meet system operating conditions. The western group of the Northwest Power Pool was very short of power at that time and the Utah system was sending all power possible to that area from its steam plants over the 274-mile, 161-kv tie line between Grace, Idaho, and Anaconda, Mont. While Utah maintained high average interchange to the Northwest (many hours in excess of 75-mw average), satisfactory control of the tie line drift between Utah-Idaho and the Northwest and the tie line load swings caused by a number of large customers on the Utah and Idaho systems was impossible. As a result many customers suffered voltage conditions that were far from desirable.

Subsequent detailed studies, made to determine the operating necessity and economic justification for automatic load-frequency control equipment, revealed that, aside from many good operating reasons, such an installation was fully justified by economic considerations. The equipment that provides adequate system operating information and control features also provides suitable facilities for loading the steam-electric plants in the most economical manner. The economic scheduling feature of the equipment, together with increased tie line capability, improved voltage at our Goshen 161-kv substation and improved scheduling of interchange over intercompany tie lines, produced sufficient savings to justify the entire expenditure involved.

To obtain the benefits of modern control equipment it was necessary to:

1. Provide the necessary telemetering and control equipment at the dispatching office, power plants and interconnecting tie lines.
2. Provide a new and greatly expanded communications system.*
3. Provide suitable operating aids for use of system dispatchers, including generating plant incremental loading and transmission system loss calculating tools, and a unique system switching diagram.

Load Control System

The new load-frequency control system is Leeds & Northrup Co. combined "fringe-sustained" (or proportional-reset) type making use of fast-acting Speedomax recorders which provide for automatic control (from a manually set console in dispatcher's office) of nine generating units at four plant locations. The nine generators, having a combined capacity of 440,000 kw, are under continuous control from the dispatching office to provide most economically the power neces-

*A companion article by J. S. Hooper, Utah Power & Light Co. communication supervisor, describing the communication facilities, will appear in a subsequent issue.

Load-frequency control equipment at Utah Power & Light's central dispatching office

sary to match system requirements, including scheduled interchange with neighboring utilities.

The control action is initiated by an "area requirement" recorder, which continuously monitors system "net interchange" and "frequency" to detect changes in system (or area) load. Generation changes are then initiated to meet the new load condition. The equipment provides for "flat frequency," "flat tie line" or "tie line bias" modes of operation.

For the purposes of control action the changing system load requirement is segregated into two components:

1. Gradual or sustained load changes which determine the general shape of the daily load curve.

2. Fast or fringe load changes generally relatively small in magnitude and of short-time duration which may be either increasing or decreasing in magnitude.

Generation changes necessary to correct for fast or fringe load changes are initiated immediately on a proportional basis. An attempt to control this type of load change on 100% basis would result in overcorrection and an unstable control system. Should the fast load change turn out to be sustained, the control action is continued on the basis of sustained requirements.

The magnitude of fringe changes permissible at the steam plants is dependent upon boiler characteristics. For UP&L plants it has been limited to plus or minus 2 mw each, which appears to be quite satisfactory. The fringe participation of the hydro plant under control is limited only by its capacity (30 mw) and rate of response of the plant and controls.

For load changes of a sustained nature, such as gradual changes or fast changes having sufficient time duration to be considered sustained, load control signals are transmitted to each plant to change total generation to correct fully for this load change. This is "reset action" in control terminology. The sustained load control signals are transmitted to each plant in accordance with a preset schedule set up on the dispatcher's load-control console. The settings on the console are based upon water conditions at the hydroelectric plants and economic scheduling of the steam-electric plants considering the effect of transmission line losses. The response of generating equipment to sustained control action has been adjusted to about 1 mw/minute/unit which appears to be satisfactory for control requirements and which is within the capability of the turbines and boilers.

The proportional-reset control action is accomplished over two control channels to each steam plant. The fringe, or proportional, channel is a frequency-shift type and, therefore, has very fast response. The sustained, or reset, channel utilizes raise-lower impulses and is considerably slower in response.

The load-control system has proved to be straightforward and versatile in design. With the exception of time spent in becoming familiar with the equipment, special training was not necessary to place the equipment in operation. In some instances, slightly different procedures were initiated at the steam plants to accommodate the more frequent load changes initiated by the automatic control equipment.

Although generation changes at the steam plants are now more frequent, they are generally in much smaller increments than were previously encountered when generation changes were made on the basis of telephoned information. Loading by telephone often resulted in generation changes out of phase with system requirements due to sudden-load reversals. With the new system, only generation changes in the proper direction to satisfy system requirements are permitted.

Economic Scheduling Equipment

In order to obtain the economic benefits of modern load-frequency control equipment it was not only necessary to provide facilities for controlling the steam plants in accordance with economic schedules but also was necessary to provide the tools for determining what the economic schedules were.

It is generally understood that for a group of generating units in one plant the most economic division of load between those units is that division of load at which the incremental cost of generation is equal for all units. It is also generally understood that for a number of generating plants the most economic division of load between those plants is that division of load at which the incremental cost of generation, including effect of transmission losses, is equal for all plants.

Slide rules have been in use for a number of years for incrementally loading generating units within a power plant. Penalty factors have been applied against the fuel price at the plant to take into account transmission losses.

The penalty factors used have often been precalculated and set up in graphic form for use by the dispatcher. There are, however, notable exceptions to this procedure going into service over the country at this time—such as the complex scheduling calculators manufactured by Leeds & Northrup, General Electric, Goodyear Aircraft and perhaps others.

The part of the Utah transmission system involved in the transmission of steam power is very simple, consisting essentially of three generator locations connected by a single transmission line. The north end of this transmission system is also the interchange point for power flow to the north end of the Utah service area.

With a simple transmission system, it was thought relatively simple tools should be suitable for determining the

Operator is adjusting subdispatching controls at centrally located Gadsby steam plant

transmission penalty factor for economic generation scheduling.

A loss equation, in the form of a 4x4 matrix, was derived covering the above described system. Calculations were being started on the hand calculator for preparation of the conventional penalty factor graphs when it occurred to us that those calculations might be made by the dispatcher as required, particularly if a simple, relatively inexpensive analog computer could be provided upon which to make those calculations. Such a computer was designed and built in UP&L's engineering department and is shown in the accompanying photograph along with the scheduling slide rule, which was also designed and built by the engineering department (except for etching the Bakelite slides).

In the design of the slide rule it was necessary to run extensive tests on each steam plant to obtain input-output information for use in determining the incremental cost of power for each unit over its entire range of generation.

The solution of the loss equation, for the losses incurred in the delivery of power from a generator to the load, requires the mathematical summation of the products of that generator power and the coefficients relating that generation to all terminals in the network.

In the calculating network setup for the Utah computer, a current proportional to each generator power is circulated through resistances proportional to the coefficients of the loss equation. The circulating current (generator power) times resistance (loss coefficient) equals loss (in per unit). Each generator circuit in the calculator is isolated and, therefore, voltage drop across one resistor in each generator circuit can be isolated and added to similar voltages from other circuits and totalized with a vacuum tube voltmeter to determine total loss in per unit attributable to a particular power plant.

By definition the penalty factor (of a particular plant) equals $\frac{1}{1.-\text{loss}}$ where the loss is that part of the system loss attributable to the generation at that plant. To read the voltmeter directly in terms of penalty factor it was, therefore, only necessary to provide a suitable scale for the vacuum tube voltmeter.

The application of the scheduling slide rule and the penalty factor computer by the dispatcher involves the following procedure:

1. For total steam generation required, determine an economic schedule, using scheduling slide rule (penalty factor of 1.0 can be used unless a more accurate value is immediately available).
2. Insert generation obtained in No. 1 above to determine plant penalty factors.
3. Insert new penalty factor into scheduling slide rule to obtain new economic schedule and repeat penalty factor calculations until the penalty factor is stabilized.

The above calculation is a successive approximation method and appears offhand to involve considerable operating time. Actually, however, the dispatcher knows from past experience approximately what the penalty factor will be and he also has set up in the slide rule the previous final penalty factor determination. Usually one or two and at the most three penalty factor calculations are necessary, requiring only a few minutes time six to eight times each day.

Utah Power & Light's new load-frequency installation has adequately filled the needs of the system and provides excellent facilities for economically loading the steam plants. With it, interchange schedules with the Idaho and Montana Power companies are now maintained within much closer limits than was previously possible. System frequency also has been much more closely regulated at times when it was necessary for Utah generation to control frequency.

FCC Rules on Interference

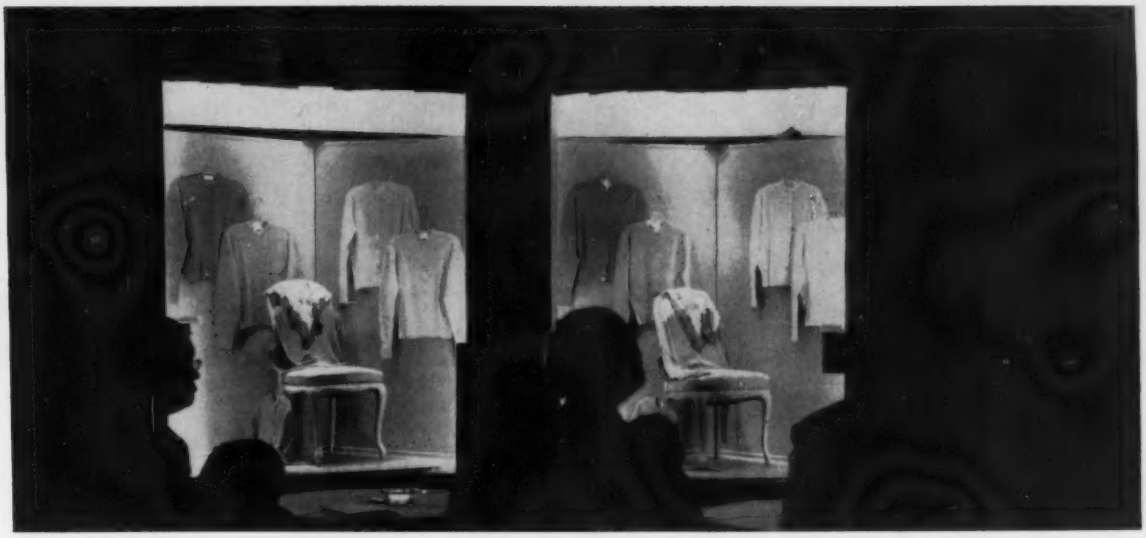
Recent action taken by the Federal Communication Commission on radio interference is of great importance to all electric utilities.

On Dec. 23, 1955, the commission issued a first "Report and Order" effective Feb. 1, 1956, covering two of eight categories. The first rule provides that incidental radiation devices, electric motors, signs, switches, ignition systems, power-lines circuits—in fact, any electrical device must be operated in such a manner as not to cause interference to authorized radio services.

The minimum language of the overall ruling in effect reads—the offender is subject to official citation by "cease and desist order" on offending equipment pending removal of interference.

The second rule provides limitations on the amount of permissible radiation from FM, television, AM and mobile receivers.

Full significance of these orders will be more apparent as the remaining six categories, including carrier-current communications systems, on Part 15 rules, are released by the Federal Communication Commission in the near future. After May 1, 1956, all receivers must have attached a FCC certification seal of approval.



Apparel merchandisers view exhibits containing identical arrangements of clothing to see how different lights affect same colors

Clinic Sells Light

A recent experience of Pacific Gas and Electric Co.'s commercial lighting men is concrete evidence that the merchandising industry needs professional lighting assistance.

Herb Spiro, executive director of the Men's Apparel Club of California, polled members to learn what they would like to have as an activity at the club's January show in San Francisco. Members responded with a request for a store lighting clinic, so John Walsh, director of commercial sales for PG and E, was approached by Spiro to see if a clinic could be arranged.

The exhibit was staged for Calmac, and also for the West Coast Salesmen's Assn. the following week. Results? From 900 visitors to the clinic in six days, 110 active prospects for remodeling and relighting were signed up and turned over to the company's division sales engineers for follow-up.

The exhibit and clinic program were worked out by PG and E with close cooperation with apparel merchandisers. It was decided that two revolving display platforms with identical exhibits would provide on-the-spot comparison of the effects of different light combinations on fabrics and colors. Standard and de luxe, warm and cool, lamps were included in these exhibits, as well as spotlights to show the need for additional lighting emphasis on standing displays.

For wider comparison, a series of shadow boxes with all the "whites," fluorescent, as well as incandescent lamps, was set up for viewing. Again, warm and cool, standard and de luxe, lamps were included.

Luminous display window backgrounds, called Shoji screens, have been developed by PG and E engineers, and one of these was exhibited. Functions are: to eliminate or reduce window reflections in the daytime; provide eye-catching backgrounds for exhibits at night or inside store.

Luminous ceiling and other lighting fixtures were also on exhibit.

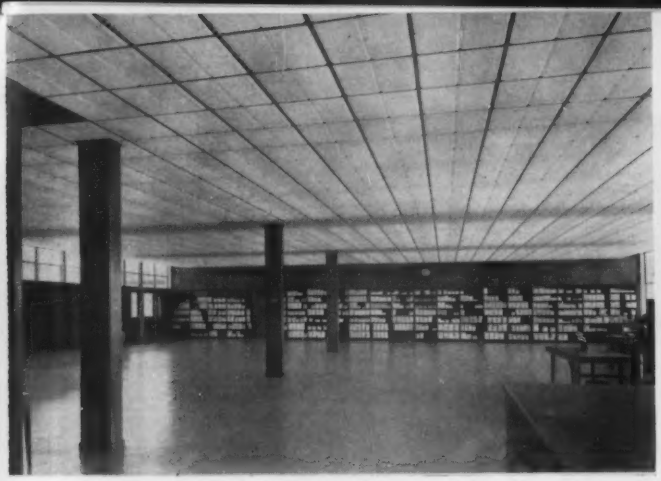
Each visitor to the clinic was taken to the exhibits by lighting engineers and salesmen. The merits of various devices and combinations of them were discussed, and the PG and E man was prepared to make recommendations.

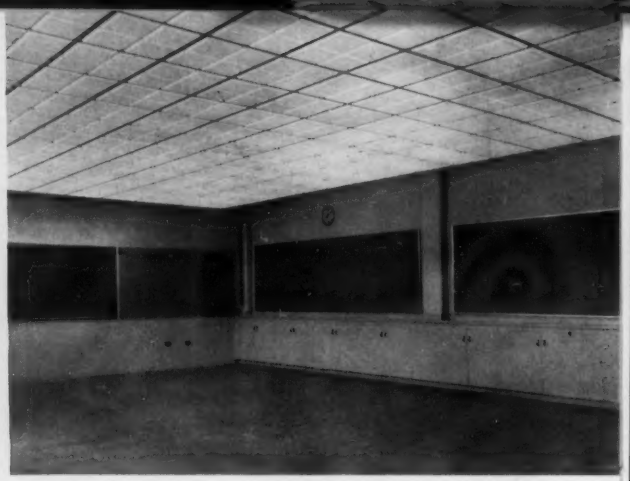
De luxe warm proved to be the one selected as best light for high-fidelity color presentation, giving way to de luxe cool for some sportswear. Free lighting engineering service was offered to prospects, with careful reservation that wiring problems would be referred to the consulting engineer, architect, contractor or electrician.

PG and E provided all parts of the exhibits except clothing, which came from Smith's of Oakland and San Francisco's Emporium.

Active in the planning of the "Selling With Light" clinic, besides Walsh and Spiro, were Charles W. Macy, R. L. Sawyier and James E. Barnes, all division lighting supervisors of the company in the Bay area.

The same displays with mannekins show effectiveness of spotlights to emphasize exhibit





Completely luminous plastic ceiling is ideal for the school library. Every classroom has a complete luminous ceiling of low brightness

This School Has Everything—

Electrical that is—480-v distribution, 277-v lighting, luminous ceilings, dry-type substations, sound and signals

Electrically a long step ahead from the little red schoolhouse with one light socket to illuminate it on dark days is the new De Anza High School in El Sobrante, Contra Costa County, not far from Richmond, Calif. This school, spread over 52 acres and designed to provide for 1,250 students, is distinguished by—

- **Luminous ceilings** in all classrooms and library, 47,000 sq ft of it;
- **480-v distribution;**
- **227 v for all overhead lighting,** switched at that voltage with the new quiet switches;
- **120/208 from dry-type** transformers, three phase, four wire, for all convenience receptacles and for shop power;
- **120/240 v, single phase** from a 75-kva transformer for domestic science electric ranges;
- **A master control** electrical system for all heating;
- **A security lighting system** on time-clock control;
- **Extensive fire alarm,** clock and program bell systems as well as a sound and intercommunicating telephone system.

G. M. Simonson, consulting electrical and mechanical engineer, says that the luminous ceilings and the method of distribution were installed at less than conventional lighting and distribution systems would have cost.

The problem in this case was to supply the 170,000 sq ft of single story buildings, spread over so great an area, at best efficiency. So Frank Takken, electrical engineer for Simonson, designed a 480-v system, from a 12-kv/480-v substation near the service building (with three 333-kva transformers), fed underground to distribution panels in each of the buildings. Since the classroom buildings were joined by an enclosed corridor that also serves for locker rooms, the panels for the 480-v feed to each building, and the dry-type transformers to get lower voltages, were located in this corridor adjacent to each row of classrooms. On the other side of the corridor was a corresponding steel enclosed panel and raceway cabinet to house and separate the signal, sound and telephone systems.

All lighting equipment above 8 ft from the floor was designed for 480/277-v operation. This includes 47,000 ft of luminous ceilings in all classrooms and library. Also the lighting fixtures used for corridors, lavatories, administrative offices, cafeteria and outside security lighting, but not the gymnasium. In the latter, high-bay Holophane units are used with 1,000-w incandescent lamps. The 227-v lighting is switched with the new 277-v rated Quiette switches in each classroom. To assure an almost tamper- or damage-proof fixture in public areas and outside, Craftlite units, totally enclosed in a Plexiglas vapor-tight shield, were selected. Ease of maintenance was an added factor.

The luminous ceilings, consisting of Daylight Ceilings Inc. double panels of translucent plastic to diffuse light and absorb sound, were installed by Spott Electric Co., the electrical contractor for the job, 24 in. below strips of 40-w rapid start fluorescent lamps on 32-in. centers. The system was designed for 50 f-c maintained levels and initial tests showed it exceeded the requirement.

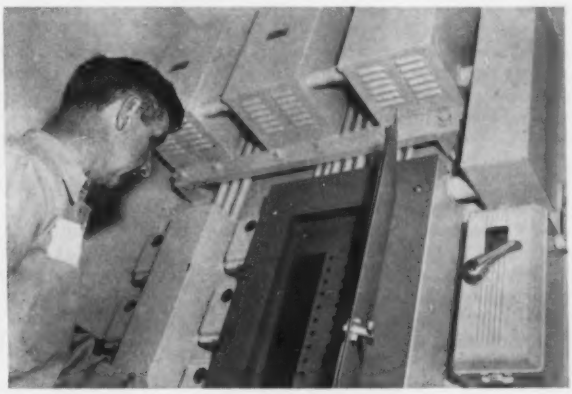
Where lower voltages were required for convenience outlets, motors for shop tools, fans or local lighting and for the electric ranges in the domestic science room, dry-type transformers were located near the load to serve them.

Architects for the school were Warneke & Warneke, San Francisco. Electrical contractor was Spott Electric Co. Don G. Loeffler was supervising sales engineer and Reave Teague the general foreman. The job ran a year and also provided need for ingenuity by the contractor for the placing of feeder conduits in lift slab type of construction used.

Gymnasium lights are Holophane high-bay units on 14x17-ft spacing, 20- to 26-ft mounting, using 1,000-w incandescents

All corridors, inside and out, locker and lavatory rooms are lighted by 227-v Craftlite tamper-resistant Plexiglas enclosed fixtures

Library basement became distribution center for panels, transformers, batteries, chargers, fire alarm, signal, clock, bell, intercom



Three dry-type 10-kva, 480 to 120/208 transformers, heat control relays, receptacle panel and main disconnect, in janitor's closet

Power for shop machines at 120/240 v is stepped down from 480 v in transformer at left. Louvered industrial units above are at 277 v

Distribution centers of panels for 227-v lighting, 120-v receptacles, are stationed in corridor on one side; for signal systems on other

No. 4 of a series on "Grounding Confusion"

Conditions for Failure

Tom Hughes
Electrical Engineer
California Division of Industrial Safety

The majority of the explosions or burnouts happen in externally operated switch cases used in motor circuits. In some cases, very little damage is done to the switch before the door is blown open and fresh air extinguishes the arc. But a person standing in front of the switch is usually severely burned over exposed parts of his body. In the photographs we have pictured two of the most severe cases of burnouts that are normally encountered in motor circuits.

Fig. 2 shows the schematic of the actual conditions existing when the pictured switch burned out. The switch was a motor-rated type, of a reputable manufacturer, rated for 30 hp at 575 v. The motor was a 25-hp, 440-v, 1,000-rpm, and drove a water pump. The switch and starter were located at the distribution center. The motor was 500 ft away and fed by three No. 6 wires in 1¼-in. conduit buried underground. The 480-v supply was from a delta secondary, normally ungrounded system.

Before the accident, the maintenance man knew that a fault ground existed in one of the motor leads, as indicated at F_1 in Fig. 2. It was only after the accident that he learned there was also the fault ground in the control circuit as indicated at F_2. After making repairs on mechanical features of the pump he closed the switch in preparation for starting the motor. Since the fault ground at F_2 energized the hold-in coil, it closed the starter contacts at the same instant, with the resulting destruction of the switch and burns on the man.

The motor starter pictured in the other photograph was not concerned with this accident but the starter (indicated in Fig. 2) could just as well have been the scene of the burnout if the high voltage had arced over in it first. Large holes were burned in the back of the switch can where the high voltage first bridged the dusty insulators at the switch blade hinges.

In Fig. 2 we have indicated the hold-in coil and the motor winding as possible inductors, by the symbol X_L. By the symbol X_c we have indicated that the whole branch circuit, including the switch and starter energized parts and metal cases, is included in the capacitive component of a series resonant circuit. This circuit may extend from phase A, at the transformer, through the capacitor, then through fault F_1 to T_2, through inductor (motor winding) to T_3 and back to the source at phase C. Or the series resonant circuit could be (and more likely was) completed through the fault at F_2 by way of the hold-in coil (as the inductor) and back to phase C at the source.

As resonance is approached, either through approximate equating of the reactances or through momentary high-frequency build-up, the voltage step up is usually greater in one or other component. The impedance of related paths in the physical layout will determine where damage may occur and how much fault current may be furnished from the source before it is choked off.

Usually the damage occurs in switch boxes, starter cases or panel boxes, which are included in the capacitive component. This is probably because they are nearest the source and also because, as was indicated in Fig. 1 (January, p 77), the inductor presents resistance to a build-up in current flow and also acts as a choke to frequency build-up. Occasionally, though, we hear of an instance where the insulation was punctured (requiring repair or rewind) in every motor winding connected to a particular set of distribution feeders.

About a year ago, one oil refinery had the majority of its motors damaged. There were no electricians on the job at the time to observe the symptoms. When the utility service crew arrived they found a primary fuse blown but apparently (from what we could determine from witnesses) none of the running overcurrent relays were tripped in the motor starters. The electricians thought that the primary fuse had blown first and then the motors had run single phase till they were damaged but some of the overcurrent units would have tripped in that case.

The reader must bear in mind that the size of the reactive components has nothing to do with the amount of voltage step up in a series resonant circuit. Neither reactance has to be large in value. The important feature is that their relative values produce near resonance for the frequency encountered. The size of wire in a coil determines the straight resistance to current build-up and the number of turns and their disposition on the core determines the inductive reactance.

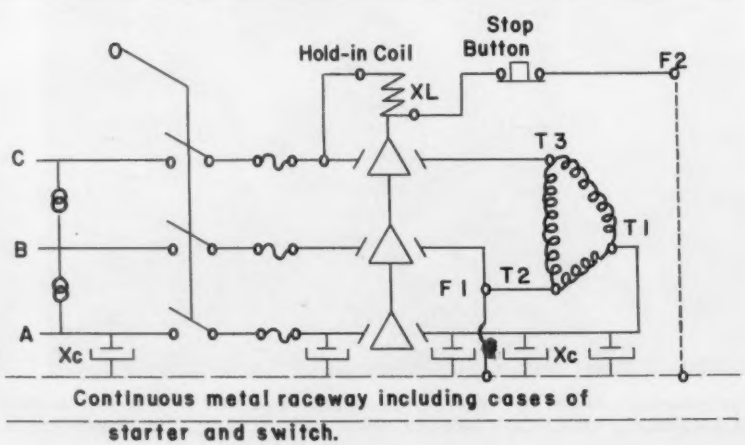


Fig. 2—Diagram at the right explains what caused the blowing up of the motor switch below. The other pictured referred to above appeared in the first of this series, on p 94 of the November 1955 issue

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

A word to grow on

"I like that word, 'Housepower'." says Chet Hefner, San Mateo county electrical inspector, enthusiastically. "It is a word that should catch on with the public. Mrs. America can understand its implications. 'Adequate Wiring' fails to accomplish the purpose. Like the automotive industry continues to sell more horsepower per automobile let the electrical industry sell more Housepower per home. I do not see how any segment of the industry can fail to benefit."

Huddle

On a $10,000,000 scale, bigger than anything the industry has ever done, a concerted drive on the American public will be made this year and for the next five to sell "Live Better—Electrically," "Housepower," the electrical part of "Operation Home Improvement," Earl Peak, Central Electric Co., San Francisco declared on his return from the top level Electrical Industry Conference, Feb. 15, in Washington. Called together for the first time by NECA were leaders of NEMA, EEI, NAED, NARDA, NAWB, IBEW, IAEI, G-E, Westinghouse, Kennecott, Anaconda, Owens-Corning Fiberglas. It was no picnic. It got right down to outlet boxes. Hair was let down and some of it pulled, but before it was over all were on the same bandwagon to arouse the public to buy more Housepower.

Aloha again

Paradise of the Pacific, in Hawaii, bids fair to return to that status after President Larry Trim of Burbank, Secretary-Treasurer Charles Smith, Chicago, and Southwestern Section President James Ambrosi flew to the Islands for two significant meetings of the Hawaii Chapter, International Association of Electrical Inspectors, and installation of new officers. One meeting was held at Lihue, Kauai, Feb. 10, arranged by W. E. Fernandez. The annual meeting and installation was held at Pearl City, Oahu, Feb. 11. John Thomas Carey was installed again as chapter chairman. The chapter had developed considerable tropical fever over the denied request for the establishment of a section and the membership was divided in its loyalties. The state-side delegation of officers sought to restore traditional Hawaiian harmony as well as satisfy the long time plea of Hawaiian members for a convention there.

Closer together

Area-wide wage and hour agreement moved a cautious step forward in the San Francisco Bay area as business managers of IBEW locals met and NECA chapter representatives did likewise to explore the possibility of such a move before going into any negotiation jointly on it. Meanwhile the pattern of what the several locals are asking seems to be the same or to reach a uniform $3.61 per hour for journeymen, including fringes, one cent more than Los Angeles without fringes. Each union asks for revisions to come within Taft-Hartley legality on union rather than closed shop. Where they all differ is in travel complications.

"Can't do that!"

In a directive to all unions IBEW President Freeman declared that no travel or expense provisions contrary to the IBEW constitution would be approved and that at the next negotiations all such provisions must be brought into compliance. All contractors from either local or outside an area were to have the same travel and expense provisions for any given job. This threw the locals with fancy travel bonuses into a tizzy and may well become a major political issue in the union.

Promised

We hope to have in detail and drawing in the next issue the jurisdictional settlement between IBEW and the Carpenters as to who installs what in a luminous ceiling job. A clear definition, published and circulated, should benefit all concerned. We hope to be able to render that service.

Another notch

Oh yes, copper went up again. Anaconda announced it first and others follow. It means more price sheet changes for everybody to keep abreast of the latest. With jobs bid so low these days price rises can be disastrous.

Team

A joint industry board to promote wiring, train apprentices and retrain journeymen has been set up in Phoenix with Albert Wendt, IBEW, J. D. Kaiser of Tucson division, Arizona Chapter NECA and Jerome Kelleher, chapter manager, as its officers.

Pocatello branch of Utah-Idaho Chapter, NECA, and local 449 of Pocatello and Idaho Falls, signed a two-year agreement raising the town scale 10c per hour to $2.90. Scale for the Arco AEC project remains $3. In March 1957 the scale for both will go to $3.10 per hour, a 10c raise for Arco and 20c for the town. No fringes. — **Up scale**

Decentralization is making it good for electrical contractors in some places; bad in others. Interesting report by the San Francisco Bay Area Council shows a total of 45,291 residential dwelling permits issued in nine counties during 1955, 10.7% above the previous high in 1954. The big increases were 35.8% in Sonoma County, 28.3 Alameda, 22.6 Marin but Napa suffered a loss of 25.9% and San Francisco 17.2. While Santa Clara County had the greatest numerical lead, the percentage increase was only 9.7. Many San Francisco contractors also complain that their industrial and business customers have moved down the peninsula. Their steady business has been lost to others. — **Changes balance**

First upturn in five months is reported for FHA home mortgage applications for the nation. Commissioner Mason attributes this to improved availability of money. The increase is greater than the normal seasonal variation. — **Good sign**

Area meeting of National Association of Electrical Distributors in Seattle, held Feb. 9 instead of Feb. 2 to follow the "Live Better . . . Electrically" broadcast, was well attended despite bad weather, Bill Jewel, zone managing director, reports. Merrill Robertson, Peerless Electric Co., was local chairman. Next zone meeting will be March 23 in Los Angeles with Ralph Rohbach as area chairman. Time and place for a San Francisco area meeting has not been settled. The first Phoenix area meeting will be held probably March 26 or 27. Arrangements will be made then for the zone convention Sept. 30 to Oct. 3 at the Westward Ho, Phoenix. — **NAED busy**

New edition of Ray Ashley's "Electrical Estimating" has been announced by McGraw-Hill Book Co. Sells for $8, is considered the authority in the field. — **Revised**

Rather severe limitations are placed on use of plastic multioutlet assemblies (such as BullDog's Electrostrip) in the western Canada area. Limits them to extensions to existing wiring systems but prohibits their use in kitchens or bathrooms, wet locations or where subject to mechanical injury. Also limits the branch circuit to 15-amp fusing. — **Limits use**

Pilot run of a program to develop the residential lighting market called "Light for Living" is being run in Cleveland by the power company and the G-E Lamp Division. It is designed to tie into the "Operation Home Improvement" idea and will consist of demonstrations, promotion, education and is to be given at least a year's fair try. — **Light up too**

For "The Man Who Writes the Specs," final details of the Eighth Biennial Electrical Industry Show April 5 to 7 in Shrine Exposition Hall, Los Angeles, are being general staffed by Charles Hays, chairman. The Electrical Maintenance Engineers Association of Southern California show already has 106 booths reserved and reservations continue to be made. The show is invitational to engineers, purchasing agents, architects, city and other governmental agencies, contractors, designers. Kick-off dinner April 5 at the Statler Hotel will be addressed by Edmund McKanna. — **Ready to open**

Los Angeles Home Show dates have been set as June 14-24 at the Pan Pacific Auditorium. Put on by the construction industries, the Los Angeles Chapter, NECA, is one of the stockholders in the corporation. Last year's attendance was about 228,000 and space sales for this year are running 54% ahead of last year. — **Next**

Two field men have been added to the Northern California Electrical Bureau staff coincident with the second round of the Certified Lighting Schools in Oakland, San Francisco, Stockton and Fresno. Both men have had extensive experience in the lighting field. H. H. Robison, retired sales supervisor, PG and E in Oakland, and well-known illuminating engineer, and Ward C. Schafer, former PG and E commercial sales supervisor in San Francisco, will back up the schooling with field help in selling certified jobs. — **Staff added**

Lighting schools began Feb. 15 in Oakland; Feb. 20 San Francisco; March 6 Stockton; and in Fresno will start later in March. Speakers include John S. Walsh, R. E. Lagerstrom, H. D. Weisser, W. R. Major, Robert G. Dummel, Fred Benz, R. L. Sawyier, C. W. Macy, Charles R. Long, O. C. Westberg, Milton C. Very, C. A. Blakely, W. R. Sears. Robison and Schafer will supervise the courses. — **Train for lighting**

New

There's a new association—46 manufacturers of air moving and air conditioning devices have named it "Air Moving and Conditioning Assn. Inc." It is essentially a manufacturers' association. Numbered among the charter members is Utility Fan Co. of Los Angeles.

Own medicine

First certificate in the northern California area went to Northern California Chapter, NECA, for the relighting of the chapter offices. Walter Vance, California Electric Co., made the installation. Gibson Supply Co. supplied fixtures. Other contractors taking full advantage of the program are Stanley Pearce Electric Co., Vallejo; Napa Electric Co., Napa; Cimino Electric Co. and North Bay Electric Works, San Rafael.

Multi-speed

A redesigned line of direct-current motors and generators especially adaptable for automatic processes in plant automation has been announced by General Electric Co. under a trade name Kinamatic. Available in March, even in the Western warehouses, like other recently redesigned motors, they give more horsepower per pound of weight, are more compact and more efficient at all easily controlled speeds. Generators to provide the d-c current have been streamlined also.

3-phase panels

In Phoenix, where three phase is supplied by the Arizona Public Service Co. for domestic air conditioning, a new type of service panel has been announced by Mullenbach Mfg. Co., Los Angeles, Wadsworth and Federal Pacific. Mullenbach presented the Arizona Chapter, AIEE, a combination fused-type service panel containing meter space, single-phase range and light and three-phase power main switches with up to 12 single-pole circuit breakers for circuit wiring. The Wadsworth three-phase, four-wire breaker panel was shown to be adapted to single- and three-phase service requirements. Similarly, Federal Pacific explained the method to adapt its three-phase, four-wire panel to single- and three-phase use. However, an insulated neutral block is a city code requirement in most Arizona cities.

Two in one

With its own built-in transformer, Remcon Division of Pyramid Instrument Corp. has created a sensation with its new low-voltage relay for remote switching of lighting and appliance loads. The system removes necessity of a separate low-voltage wiring system alongside the 120-v system. As many switch control points as wanted can be operated from each relay. The relay on the 120-v side is rated at 10 amp or 1/3 hp. Momentary contact switches at 24 v, 3 amp. UL listed. Operating voltage, however, is only 6 v.

Finally approved

Armored cables with thermoplastic-insulated conductors have stood Underwriters' Laboratories tests. Samples were submitted by three manufacturers and found acceptable, and the electrical grade Opalon vinyl chloride meets type T requirements of the NE Code. It's made by Monsanto Chemical Co. Known as ACT-type cables, they were developed by Columbia Cable & Electric, Clifton Conduit, and Ettco Wire & Cable.

Separate manufacture

Gill Glass and Fixture Co. has announced that all fluorescent fixtures in its planned lighting line will hereafter be manufactured and marketed by Metalcraft Products Co. Gill will concentrate on its residential and commercial incandescent fixtures, while Metalcraft will handle the fluorescent commercial and industrial lines.

New trend

Foreseeing a trend toward grid-type suspended ceiling construction, All-Brite, Fluorescent Fixtures of California, has introduced a Grid Recessed Area Liter for mounting in such construction. Provision is made for joining fixtures end to end, and for suspending either independently or in the grid.

Pioneer dies

Joseph M. Carlson, founder of Central Electric Co., San Francisco and Palo Alto, 50 years ago next year, died suddenly, age 71, Feb. 14. Born in Chicago, he came to California in 1896, established Central Electric in 1907. Although semi-retired, he was still vice-president and treasurer and his son Everett was made president in 1947. He served at one time as president of the San Francisco Electrical Contractors Assn.

Another

Arthur R. Fierce, another old-timer in Los Angeles, died Jan. 19, age 73. In 1908 he and James Lowe co-founded a company now known as Electric Corp. and later he worked for Ladco and Gaines Electric.

Unavailable as yet

Tough on panelboard manufacturers is a new California Electrical Safety Order, effective March 11, reading: "Where single-pole circuit breakers are used for the protection of ungrounded conductors in a branch circuit, the breaker handles shall be arranged to disconnect all ungrounded conductors simultaneously." Purpose is to disconnect all sources of energy when one pole is

tripped manually, although not from overload. Los Angeles Code, adopting the same rule, allows manufacturers time to dispose of existing stock until May 1 by permitting suitable field-installed handle ties. Also required is a conspicuous label for the main.

Promoted

Elmer Aldridge with Appleton Electric Co. in Los Angeles is moving east to become assistant vice-president in charge of sales. Replacing him for southern California is William Monday.

Appointed

Industrial Supply Division of Forest Products Co., Kalispell, was named distributor of Westinghouse Sturtevant Division's small air handling, heating and ventilating products. Located at 175 N. E. Railroad St., Kalispell, the firm serves Montana and Idaho. C. H. O'Neil is manager.

Change officers

Electrical Industry Bid Depository of California, operating in San Francisco, Alameda and Contra Costa Counties, elected W. J. Nagel, A. Neri Inc., Oakland, as president; Fay Lemoge, Lemoge Electric Co., San Francisco, vice-president; and Garth Chamblin, California Electric Construction Co., San Francisco, secretary, at its annual meeting Feb. 14, San Francisco. Other directors elected included Conrad Abbott, retiring chairman; William Langlais; Mervin Mayer, Pacific Electrical & Mechanical, for San Francisco; E. L. Farris, Accurate Electric; J. P. Names, Names & Woodward; and Robert Schwartz, Schwartz & Lindheim, representing the East Bay. Speaker was Clyde Chamblin, who gave a revealing and significant history of electrical contracting in the Bay Area since 1904. (See p 10.)

Plans for convention

Rocky Mountain Chapter of "The Representatives" has elected Dick Hyde as president, William Peyser vice-president, William Golliher as secretary and Ken Raymond as treasurer. Preparations are being made for a third Rocky Mountain Conference at Glenwood Springs Aug. 30 to Sept. 2.

More elected

Southern Colorado Chapter, NECA, at Colorado Springs recently elected Keith L. Wilson, Electrical Construction Co., chapter governer. He has been president since the chapter's organization in 1954. Harold Whitney, Whitney Electric Co., becomes president. Simon Halle continues as chapter manager . . . Central New Mexico Chapter at Albuquerque elected Harry T. Gamblin as president; Fred L. Mulberry, Reynolds Electrical & Engineering Co. Inc., vice-president; John N. Yearout treasurer; Wilbrod A. Chauvin governor.

Protects goodwill

Taking some of the boss's best customers after quitting their jobs and setting up a rival business can result in damage suit by the boss, according to a recent New York Supreme Court decision.

Dues question

Agency shop contracts are being sought by the unions in states with "right to work" laws to require fee payments from nonunion workers equal to union dues. North Dakota's attorney-general ruled, however, that the fee payment must be voluntary and no reason for discharging.

Clarifies code

Oakland has just issued a new electrical code, effective Feb. 27, 1956, according to D. H. Hansen, chief inspector. It follows the 1953 National Electrical Code with "specific interpretations of the meaning and intent of various rules." The preamble also states it makes an effort to anticipate the trend toward uniformity in codes but does not lower Oakland's standards too drastically.

Speakers

Last minute word from Inland Empire Chapter, IES, Spokane, tells that the Pacific Northwest regional conference, April 19-21 at Davenport Hotel, Spokane, will have, in addition to R. F. Hartenstein, IES president, and C. L. Crouch, IES technical director, J. Willard Brown of G-E, Nela Park, speaking on "Mercury Vapor Lighting" and "New Lighting Sources"; Stacy Stanley, Line Materials Co., on "Industrial Lighting" and "Street Lighting"; Gene Rae, Holophane Co., on "Glass"; R. G. Slauer, Sylvania, "Panelescent Lighting and Other New Sources"; Walter Potter, Portland's district engineer, G-E Lamp Division, on "Parade of Progress"; and J. S. Hamel, electrical engineer, Burbank, on "Lighting of Disneyland." A speaker from Westinghouse will discuss ballasts.

Strides made

Idaho's state electrical inspection, under the amendments to the basic law, since last June has made great progress in all parts of the state. A recent booklet published by the Department of Law Enforcement giving the amended law and regulations has been circulated. Another inspector is being added to the staff soon, making a total of seven men in the field. It is now possible to inspect all commercial buildings and most town and farm homes before the wiring is closed in, according to J. Carl Baldridge, state inspector. Cooperation both from industry and the public has been fine.

All-glass front makes a show window of the entire front, featuring big fixture display

Grown from four to 13 employees, the Shurgin organization now. Front row: Bea Mendoza, Sam Shurgin, owner, Mildred Shurgin, secretary-treasurer, Jim Gowey, Bobby Wilson; rear row: Lee Mudd, Stella Lepczyk, Dave Lichman, Jack Paul, Al Nover, Ed Gale, Jan Gray and Willie Molina. Peg board used for wall displays behind them is another idea

Design Speeds Service

All the ideas and experience gathered from operating since 1934 were distilled into better methods and facilities in the new showrooms and warehouse recently opened at 1530 E. Washington St., Phoenix, by S. B. Shurgin, proprietor of Electrical Distributing Co. Having outgrown old quarters at 400 W. Madison with four separated warehouses, Shurgin incorporated in his new place these features:

- Both self-service and counter service for electrical contractors, as well as a drive-in window and a will-call window for quicker pickup shipments.
- A pneumatic-tube system between departments as well as an intercommunication system.
- Fixture display of 800 fixtures, one of each kind stocked, grouped by kinds of application. A false ceiling of wood slats mounts fixtures but conceals outlets and wire above. Recessed fixtures mounted on T-bars to enable moving and replacing them.
- Steel shelving for small items and to aid in self-service. Unistrut used for heavy shelving in warehouse. Self-service carts for contractors to pick up materials. Hoist on I-beam to handle heavy reels, etc.
- Warehouse daylighted through green Coralux roofing on steel beams. Has 10,000 sq ft on floor, 4,000 more on mezzanine. Both central heating and air conditioning throughout.
- Office lighting through Hexcell aluminum louvers in cross pattern panels with air conditioning vent in the center. Pleasing pastel colors chosen by Mrs. Mildred Shurgin, treasurer. Glass front makes show window of the showroom. Has 11,000 sq ft parking lot outside.

Electrical Distributing Co. serves Arizona, New Mexico, western Texas and border cities of California and Mexico. Its principal lines are of wiring materials, lighting fixtures, lamps and signal equipment.

"Temporary" Adapter

Elimination of the temporary service pole is possible for tract home builders by using an auxiliary meter and receptacle device that can be plugged into the meter socket of a permanent service entrance. Hill Electric Co. of North Sacramento has made up such an auxiliary which Michael & Neher Construction Co. has used successfully in a number of instances.

It consists of a metal enclosure as shown, on which is mounted a meter socket and a hinged cover over a group of 120- and 240-v receptacles for use during construction. On the back are bayonet-type contacts and a ring that permits the enclosure to be plugged into the permanent meter socket and to by-pass it. The service conduit and meter socket are installed as soon as the framing is ready.

The utility, Sacramento Municipal Utility District in this case, likes it because it reduced the number of calls to the house. It makes its one and only service drop to the house itself. It sets the meter on the auxiliary unit to bill the builder. Another call to reset the meter permanently on the meter socket underneath is made when the home is occupied. The builder likes it because it saves him the "up and down" charges of $15 for service to a temporary pole. It also saves the cost of such a pole.

Designed by Virgil Hill, the device contains circuit-breaker protection, grounding-type outlets, and either 120- or 240-v supply. Its cost is about $45. Patent has been applied for.

Virgil Hill with auxiliary plugged in place

ELECTRICAL WEST

Another "First" for the West

BY this summer, customers on the lines of the Southern California Edison Co. will be utilizing electricity generated atomically. They won't be aware of it because those kilowatt-hours will be no different than the ones they had been using in the past. It is significant, however, that these new kilowatt-hours will come from the first nonmilitary atomic energy reactor in the whole U. S. and that they will be delivered over the lines of an investor-owned company.

The utility is buying heat from a sodium graphite reactor pilot plant now being completed by the Atomics International Division of North American Aviation Inc. The reactor itself is part of the Atomic Energy Commission's atoms-for-peace philosophy and is designed to further progress in the development of economical atom-powered generating plants.

Under agreement, Southern California Edison will be empowered to construct and operate a heat exchanger and turbogenerator unit of 7,500-kw capacity at no cost to the government. It will cost the Edison company over a million dollars. Electricity from the station will be fed over Edison lines to the Santa Susana area.

The new station will be in operation well ahead of any other similar facility in the United States. Congratulations are in order to the management of the Southern California Edison Co. for a progressive move which gives California and the West this distinction.

New Strike Issue

PENNSYLVANIA'S Department of Labor and Industry brands the Westinghouse strike as a "lock-out." This ruling is based upon the refusal of the company's management to submit issues of the strike to arbitration or fact finding. Politically, it would permit strikers to draw unemployment compensation.

This action is a dangerous intrusion into democratic processes. First, Westinghouse was not given an opportunity to appear or be heard in connection with the "lock-out" ruling. Second, the facts indicate that no lock-out action has been taken. Rather to the contrary, the company on three occasions has proposed a return to work pending further negotiations and has kept its plant gates open to any employee who wished to work provided the union would let them in or that proper law enforcement would permit them to enter. Third, and we now quote from a company statement, "If the governor's arbitration proposal is the basis for the Labor and Industry Department's ruling that strikes then become lock-outs, it means that any proposal by the governor, no matter how fantastic or unreasonable, automatically makes a strike a lock-out if the proposal is rejected by the employer."

This move can only be interpreted as an attempt by union leaders to inject political pressure into a situation which can only be resolved by a full appreciation of the economic and competitive facts of business life. It can only serve to becloud further an already complicated atmosphere for negotiations. If the ruling is not rescinded or rejected by court action, it could completely upset the whole structure of labor-management relations.

Naturally the Westinghouse management will appeal the ruling. In doing so, as was stated in these columns last month, the company is still "fronting" for all management.

Plant Location—A New Trend

COST of electric power is becoming less and less a factor in plant location. At least recent developments indicate that it's not power costs but power availability in the future that is a determining factor. But still more important in decisions concerning the location of large plants seems to be both the availability of markets and raw materials. "Marriages" of big industrial operations seem to be the order of the day.

For example, four big new aluminum plants will be situated in or near the coal-rich Ohio Valley area. Coal reserves there

EDITORIAL VIEWS

insure a long-term, reliable, and low-cost fuel source. One project envisages a 1,350,000-kw steam plant. Of the first two units, one will be owned by an electric utility and the other by the industrial corporation. The fuel, in part, will be char, a cokelike residue from coal distillation by the industrial plant.

In another project, aluminum will be sold in molten form to one of the large automobile manufacturers whose nearby casting plant will convert it into finished products. This arrangement eliminates the transport and remelting costs of aluminum ingots.

In still another instance, a large plastic manufacturer decided to locate a new large production facility adjacent to an oil refinery where ethylene, one of its major raw materials, would be readily available.

This trend cannot help but develop political and industrial repercussions in the West. Federal power proponents who have leaned heavily on the creation of low-cost hydro power as an argument for industrial development may have to find a new prop. Industrial development departments may have to go much deeper into the relationships between markets and the raw material resources west of the Rockies to see if enticing unions between different industries might not be possible.

With the accent on bigness and on automation, utilities, themselves, may have to spur their efforts to provide large blocks of low-cost power. Without the coal reserves of eastern areas and with the end of its really low-cost hydroelectric potential in sight, it might just be possible that the West will lead the parade in atomic generation 25 years hence.

"Yes" on Underground

FIRST break in the long-established utility policy of charging customers the difference between overhead and underground service, if they want the latter, comes from Southern California Edison in the filing of a surcharge rate with the California Commission. All classes of service are covered.

Based on a cost ratio of seven to one, the surcharge for residential underground service would be $4.25 per month, plus an additional energy charge of half a cent per kilowatt-hour.

Without presuming to pass on the correctness of the arithmetic or reasoning back of Edison's proposed rate, we do hail the move as being in the right direction. At least it is a positive approach to an old, old problem.

Taxation vs Capital Needs

ONE of the most vital economic problems of the day is the effect of the present progressive tax structure, and high corporate rates, on our supply of venture capital. Both logic and the actual record of equity investment in recent years show the shortage of capital funds is only too real. The present excessive and discriminatory rates must be considered the greatest obstacle to our economic growth. They prevent the saving and investment necessary to the nation's needs and to provide the continuously rising standard of living to which we have become accustomed . . .

Nevertheless, the Subcommittee on Tax Policy, Joint Committee on the Economic Report, was presented during its recent hearings with a number of papers purporting to show that after all, the present taxes have had little if any effect on investment; or that our capital needs are declining; or that because of the way state and local taxes operate, federal taxes are not as progressive as they seem.

It is extremely important that these arguments be analyzed. Their possible influence on national tax legislation cannot be overlooked. It is directly in the public interest that these attempts to justify the present tax system, and to minimize its harmful effects on the nation's economy, be carefully dissected to reveal how much truth and how much error they contain.—National Association of Manufacturers.

The Year Advertising Helped

IN 1954 we had a business recession in the United States. Sales fell about 4% during the year. If management had followed the historic pattern of business ups and downs, advertising volume would have fallen much further.

But in 1954 the volume of advertising did not fall. It increased over 5%. Every effort was made to stimulate sales when sales were needed to sustain prosperity.

This was something entirely new under the sun. It had a powerful influence in making the recession of 1953-54 one of the mildest on record. It helped greatly to speed business on to the record-breaking levels it has attained today.

There are several reasons why America's business management attacked this decline in sales with more advertising. One of them grew out of the greatly strengthened position of the American consuming market. Consumers' income after taxes has been rising an average of over $10 billion a year since 1946, and this rising income is more widely distributed than ever before. Furthermore, consumers have piled up reserves of about $215 billion in cash or its equivalent. These reserves offer a new and powerful inducement to increased selling and advertising effort even in the face of a possible decline in consumer income.

Taking the Longer View

However, the principal reason why a sales decline was attacked with increased advertising is management's new-found conviction that good advertising is essentially an investment in the development of a market. Successful development requires sustained investment. The inclination of business management to take this longer view, is, of course, motivated by the fact that the American market, with over 3 million consumers being added annually, is growing at a prodigious rate.

Ten years ago only a handful of companies had plans for investment in new producing facilities extending beyond the current year. Today almost all leading companies have investment programs running some years ahead. And keeping pace with these long-range business investment plans has been the development of sales and advertising programs to

McGraw-Hill
PUBLISHING COMPANY, INC.
330 West 42nd Street, New York 36, N. Y.
ABP ABC

HEADQUARTERS FOR BUSINESS INFORMATION

Kill a Business Recession

reach tomorrow's greatly expanded markets.

This crucial role of advertising in providing driving power for our economy is gaining greater recognition every day. In his recent book, "People of Plenty," Professor David M. Potter of Yale University remarked: "Advertising is not badly needed in an economy of scarcity, because total demand is usually equal to or in excess of total supply, and every producer can normally sell as much as he produces. It is when potential supply outstrips demand—that is, when abundance prevails—that advertising begins to fulfill a really essential economic function."

Advertising's Key Role

Today abundance so completely prevails in the United States that it has been conservatively estimated that as much as a third of everything offered for sale falls in the realm of "optional consumption." That is, consumers can "take it or leave it" without any immediate personal inconvenience. But if they decide to "leave it," a terrific economic depression will not be far behind. In such circumstances, advertising—in which, in all of its forms, we are now investing about $9.2 billion annually—clearly is of crucial importance to our continued prosperity.

In performing its key role in past years, American advertising never realized its full potential. It successfully promoted sales. But it never was called upon to promote an overall economic stability as a direct outgrowth of increased sales.

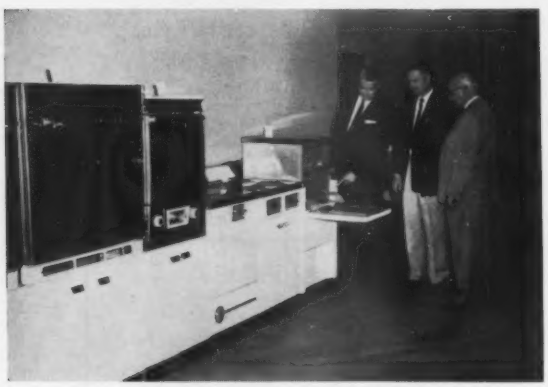
By successfully promoting both sales and economic stability, as it did in 1954, advertising surely has added new strength to the American economy. It has also added a great new and constructive dimension to advertising itself. This accomplishment gave great significance to the celebration of the first National Advertising Week in February, 1956.

One of the surest means of expanding your sales volume in today's $150 billion *industrial* market is through dominant advertising in the publications directly serving your major customers and prospects.

McGraw-Hill's business and technical publications can give you quick access to the men who initiate, specify and approve the purchases of industrial products and services. Because all are leaders in their respective fields, you are assured a maximum return on your investment when you specify a McGraw-Hill publication to carry your advertising to your most important markets.

Ralph Sheetz, northern California manager, Tappan, gives pitch on new electronic oven; Tony Lascala, branch manager, watches

Jack Miles, Central Electric, Palo Alto, and Frances Alexander, Crosley-Bendix home economist, look at Bendix power surge washer



Bud Schuster, Dallman sales manager, operates Philco's elevator oven for W. H. Bishop, Delta, Utah, and "Press" Pressnall, Dallman

Below: R. H. Larsen, Frank Edwards Co., shows Thermador double oven to S. Gavce and M. Kamson, Central Furniture Co., Merced

Bert Reynolds, NCEB manager, Edwin Vennard, director elect of EEI, O. R. Doerr, PG&E vice-president, talk together before the Wednesday trade dinner. Vennard was a speaker; Doerr presided

Dealers were buying at

Winter Market

With attendance up 30% and orders averaging about 25% above those placed last year, the San Francisco winter market bore out optimistic forecasts. Built-ins and color continued to attract attention and biggest volume of orders was in laundry equipment and refrigeration.

Speaker for the electrical industry at the Radio-TV-Appliance dinner was Edwin Vennard of Chicago, president of Middle West Service Co., who in June becomes EEI vice-president and managing director. C. S. Stackpole of New York City spoke for the gas industry.

Looking ahead for 10 years, Vennard predicted that we are going to be 40% better off as a nation in productive output and disposable income. This prediction assumes that we will not go to war and that Republicans will continue to "act like New Dealers," spend their way to prosperity, he said.

Just the way we are going, use of electricity in the home will be up two and one-half times in 10 years and revenue will almost double; price of electricity will continue down.

In the normal course, California by 1965 will be selling each year: 152,000 ranges; 165,000 dryers (75% washer-dryer combination); 350,000 refrigerators (up 50% on this appliance because frozen foods are hastening obsolesence); 600,000 TV sets.

Changing peaks and load balancing will make some unprofitable items—such as room coolers—profitable.

We haven't done as well as we might in lighting, he said, because there is no competition. We are not selling one-tenth the lighting the housewife wants.

In 1955 dollar volume on major appliance sales in California was $380,000,000, he pointed out. With no change in effort it could be $1¼ billion in 1965, he said. If California would do as well as some market areas the figure would be about double that, he thinks.

He advised dealers to tie in to national programs, to concentrate effort. Distribution needs improvement, he said; manufacturers should reduce the number of appliances; better standardization would bring better service. Don't ever forget the human side, he said. We can never replace the salesman. He has to go out and make the sales and needs to be trained.

Dale LeRoy, Graybar, talks with G. D. Gilbreath and R. C. Rhoades of John Breuner Co., San Francisco, in Hotpoint booth

Easily distinguished by canes and big bow ties were Easy's staff. Here are R. Grimm, Jack West, Pam Myers, B. Morris, D. Wallrich

Vic Musy of Westinghouse shows color combinations available in new appliance line to John Gillivan, John Breuner Co., Oakland

J. J. Lukanish shows Gibson vertical broiler to George Klor, Klor TV and Appliance Co., San Francisco. Unit fits all Gibson ranges

T. H. Ryan and Ralph Stoddard of Ryan Distributing Co. look over Manitowoc's two-zone unit, which holds almost 800 lb of food

George Day, G-E district service supervisor, San Mateo, and Clyde Disher, G-E Supply, Oakland, with manufacturer's Hospitality TV

Far Western Utilities

Summarize 1955 Sales Record

Customers and Residential Consumption

Utility Territory	Average Annual Kwh, Residential 1955	1954	1953	1952	Residential 1955	1954	Rural 1955	1954	Commercial 1955	1954
Alameda PU Dept.	2,136***	2,069	1,874	1,788	13,451	13,159	...	...	1,316	1,265
Arizona PS.	2,682	2,570	2,370	2,262	114,306	109,246	...‡	...‡	21,378	20,239
Bountiful Elec.	362	360	354	350	2,850	2,364	0	0	150	146
B. C. Elec., Vancouver	3,822	3,441	3,039	2,782	196,082**	185,382**	...	...	31,692	29,836
B. C. Elec., Victoria	3,317	2,998	2,672	2,451	30,068	28,960	10,204[30]	9,560[30]	6,219	6,099
B. C. Power Com., Victoria	3,100	2,800	2,500	2,100	50,900	47,000	...	...	8,400	7,800
Burbank PS Dept.	2,198	2,140	2,035	1,945	30,300	30,085	...	...	4,286	4,168
Calif. Elec. Power	2,220	2,130	2,044	2,006	70,577	64,753	2,207	2,115	11,443	10,802
Calif. Oregon Power	8,006	7,510	7,332	6,738	69,510	67,062	1,364	1,275	13,750	13,431
Calif.-Pacific Utilities	5,464	4,952	4,817	4,346	22,066	21,878	2,453	2,512	4,836	4,689
Central Lincoln PUD, Newport	8,420	7,312	6,634	5,698	9,152	8,818	...	...	1,799	1,773
Cheyenne LF&P	2,356.60	2,202.51	2,067.21	1,961.70	12,683	11,965	240	285	1,816	1,745
Colorado Central Power	2,345	2,177	2,139	1,919	17,031[26]	14,996[26]	5,827[27]	6,341[27]	1,855	1,767
Elko Lamoille Power	2,366	2,269	1,896	1,818	2,026	1,944	...	...	494	506
El Paso Elec.	2,643	2,527	2,382	2,185	66,237	62,019	270	271	8,548	8,233
Fairbanks Municipal Utilities	253	235	221	231	4,590	4,327	0*	0*	757	739
Fort Collins L&P Dept.	185[2]	175	150	135	5,626	5,487	...	...	975	948
Hawaiian Elec.	3,788	3,501	3,221	3,076	79,348	75,274	...	...	15,236	14,995
Heber L&P	6,033	...	...	...	1,153	1,104	157	207	144	141
Helper City L&P	500	400	300	250	1,000	990	0	0	250	250
Hilo Electric Light	2,534	2,303	1,973	2,110	5,884[24]	5,798[24]	7,111	7,141	2,820	2,800
Home L&P, Greeley	2,907	2,795	2,662	2,499	7,886	7,795	3,030	2,787	2,501	2,817
...	...	...	...	...	...	...	333[11]	...	...	...
Idaho Power	5,719	5,364	5,081	4,961	76,610	75,035	27,858	28,051	19,296	18,485
Imperial Irrig. Dist.	5,251	4,891	4,500	4,455	20,771	20,143	923	922	3,950	3,849
Intermountain Rural Elec. Assn.	1,728	1,593	1,476	1,341	24,738	18,498	42,345	40,979	8,314	5,563
Ketchikan PU.	5,475	5,467	5,893	5,485	2,250	2,280	360	325	525	526
Lamar L&P Dept.	1,882	2,043	1,863	1,778	2,378	2,394	75	83	536	516
Los Angeles Dept. of W&P	2,031	1,937	1,865	1,804	679,308[25]	...	...	...	123,235[26]	...
Matanuska Elec. Assn., Palmer	243	223	194	164	990	972	268	251	168	191
Maui Elec.	2,892	2,688	2,532	2,412	8,591**	8,585**	...	...	1,815[4]	1,814[4]
Mineral County Power System	2,698	2,550	2,405	2,214	1,143	1,070	0	0	224	190
Modesto Irrig. Dist.	3,333	3,154	2,926	2,796	20,919**	19,938**	547[17]	514[17]	2,581	2,492
Montana Power	3,241	2,942	2,672	2,519	117,332	113,234	15,909[2]	15,444[2]	17,006	16,749
Mountain View Elec. Assn.	1,945	1,800	1,658	1,532	1,056	1,060	2,437	2,347	710	683
N. M. Elec. Service	2,167	2,002	1,816	1,602	7,586	7,016	29[11]	26[11]	1,287	1,215
Northern Lights	314	241	197	173	539	467	1,883[10]	1,835[10]	196	173
Otero County Elec. Co-op.	168	147	126	108	773	...	1,372	...	302	...
PG and E.	2,616	2,458	2,340	2,281	1,082,471	1,019,646	355,311	343,751	217,135	211,311
Pacific P&L	6,108	5,542	5,096	4,847	203,034	200,521	29,737	27,660	32,970	33,131
Palo Alto MU	2,356	2,066	...	...	13,189	11,446	0	0	2,229[4]	1,992[4]
Pasadena L&P Dept.	2,016	1,925	1,843	1,760	40,588	39,493	...	...	6,081	6,008
Port Angeles L&P	7,844	7,090	6,435	5,930	4,793**	4,612**	...	...	861	850
Portland GE	7,645	6,929	6,228	5,966	203,742	198,556	[2]	[2]	26,086[4]	56,601
Poudre Valley Rural Elec. Assn.	4,121	3,924	3,645	3,381	26	26	3,707	3,531	60	56
Provo Dept. of Utilities	3,000	2,977	2,891	2,713	7,711	7,520	0	0	1,077	1,018
PS of Colorado	2,109	1,995	1,861	1,707	227,659	197,803	247[25]	240[25]	29,567	28,240
...	...	...	...	...	...	...	8,706[10]	22,914[10]	...	...
PS of N. M.	1,941	1,826	1,736	1,530	68,339	65,163	695[11]	395[11]	9,454[4]	9,007[4]
PUD of Benton County, Wash.	10,243	8,966	7,802	7,725	7,705	7,255	106	87	1,017[7]	958
PUD No. 1 of Chelan County, Wash.	6,576	6,035	5,361	5,182	8,087	7,045	3,840	3,722	1,661	1,410
PUD No. 1 of Clark County, Wash.	8,149	7,206	6,485	6,051	27,045**	26,509**	...	...	2,987	2,859
PUD No. 1 of Cowlitz County, Wash.	10,840	8,907	...	...	18,373	17,889	6,047	...	2,269	2,171
PUD No. 2 of Grant County, Wash.	12,669	10,612	8,740	8,251	9,702	7,744	512	448	2,013	1,977
PUD No. 1 of Grays Harbor Co., Wash.	7,175	6,295	5,583	5,089	12,097	11,828	4,991[10]	4,795[10]	3,224	3,174
PUD No. 1 of Lewis County, Wash.	6,898	6,192	5,500	4,820	10,494	10,374	...	...	1,001	1,011
PUD No. 3 of Mason Co., Wash.	6,691	5,955	5,571	5,179	5,134	4,927	...	...	550	538
PUD No. 1 of Okanagan Co., Wash.	7,040	6,395	5,801	5,552	6,576	6,480**	824[11]	722[11]	1,046	1,023
PUD No. 2 of Pacific County, Wash.	8,620	7,907	6,908	6,319	5,845	5,708	0	0	1,261	1,266
PUD No. 1 of Snohomish Co., Wash.	6,833	5,857	5,254	4,844	47,219**	44,196**	...	...	4,470	4,300
Puget Sound P&L	6,540	5,854	5,223	4,935	166,048	159,228	...	...	17,302	16,428
Raton PS	3,145	2,920	2,876	2,610	2,406	2,341	0	0	399	383
Riverside PU Dept.	2,896	2,508	2,352	2,399	21,441	20,012	...	...	1,978	1,902
Sacramento MUD	2,817	2,688	...	...	104,575	96,665	3,828	3,784	13,694	13,057
Salt River Power Dist.	3,879	3,835	3,575	3,545	42,853	36,845	444	...	3,326	2,681
San Diego G&E	2,575	2,395	2,296	2,244	162,934	154,035	57,304	56,109	29,686[4]	27,867[4]
Seattle Lighting Dept.	7,488	7,078	6,485	6,312	195,876	190,221	...	...	25,553	24,880
Sierra Pacific Power	4,548	4,274	4,073	3,857	28,502	26,556	...	...	4,956	4,676
Southeast Colorado Power Assn.	3,340	2,928	2,568	2,544	1,130	1,127	4,102	4,310	510	513
Southern Calif. Edison	2,033	1,931	1,829	1,739	1,111,570	1,036,403	22,983	22,450	133,108	128,986
Southern Colorado Power	2,068	1,957	1,882	1,775	33,559	32,652	4,621	4,466	5,440[4]	5,370[4]
Southwestern PS	2,004	1,850	1,690	1,590	129,491	123,204	12,110	11,975	26,274	25,541
Springer Elec. Co-op.	1,169	1,041	1,020	...	680	827	1,183	911	341	308
Tacoma PU Dept.	8,504[21]	8,212	7,244	7,077	50,553[21]	51,398	0	0	5,755	5,755
Telluride Power	3,922	3,631	3,300	3,094	7,437**	7,518**	...	...	1,532	1,557
Tucson GL&P	2,255	2,139	2,093	1,954	50,322	47,301	350[11]	364[11]	8,449[1]	7,957[1]
Turlock Irrig. Dist.	4,140	4,000	3,700	3,600	15,974	15,385	...	...	2,466	2,375
Uintah P&L	4,376	3,972	3,775	3,537	1,055	1,084	...	...	288	310
Utah P&L[20]	3,785	3,545	3,417	3,180	174,778**	168,536**	...	...	18,480	18,071
Vigilante Elec. Co-op.	438	404	383	339	498	450	1,079	1,078	193	187
Washington Water Power	7,487	6,910	6,371	6,182	96,746	93,906	20,751	20,471	14,145	13,929
Yellowstone Valley Elec. Co-op.	330	310	290	261	350	337	1,831	1,797	149	145

* Serviced by REA. † Includes street lighting. ‡ No rural classification. ** Includes Rural. *** As of June 30. [1] Includes power and light. [2] Estimated. [10] Residential. [11] Irrigation. [12] City only. [14] Includes large users. [24] City. [25] Seasonal. [26] Schools, churches, halls. [27] Irrigation and drainage. [28] Municipal [29] Changed to bi-monthly billing. [24] Plus governmental and water system. [25] Power. [30] Includes space heating. [27] Includes residential and commercial.

• **This is the 1955 sales record** of Far Western utilities as reported by individual companies. In so far as possible, these figures follow Federal Power Commission classifications. The following comments by reporting utilities may help in their interpretation or give added information.

California Oregon Power Co. reports sale of 4,700 electric heaters in its territory for an estimated 9,400 kw. Seattle City Light plans to merchandise electric water heaters for commercial use only.

Puget Sound Power & Light Co. explains that appliance sales reported are on the basis of 10 months actual, two estimated. Customer and kwh figures

Customers and Residential Consumption

Industrial		Street Lighting		Public Authorities		Other Electric Utilities		Total		
1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	Utility Territory
358[1]	337	2	2	129	134	...	...	15,256	14,897	Alameda PU Dept.
1,465	1,533	...	...	290†	277†	[3]	7	137,447	131,302	Arizona PS
0	0	1	1	1	1	...	...	3,002	2,512	Bountiful Elec.
4,403	4,337	34	32	...	...	...	...	232,211	219,587	B. C. Elec., Vancouver
594	596	6	6	...	...	...	...	47,091	45,221	B. C. Elec., Victoria
1,100	1,000	87	79	...	...	...	...	60,487	55,879	B. C. Power Com., Victoria
1,359	1,300	1	1	...	...	...	...	35,946	35,284	Burbank PS Dept.
245	246	118	100	16	16	10	[3]	84,616	78,040	Calif. Elec Power
424	403	110	88	73	65	4	5	85,235	82,329	Calif. Oregon Power
27	28	42	42	17	16	...	1	29,441	29,166	Calif.-Pacific Utilities
49	48	10	10	...	...	...	...	11,010	10,649	Central Lincoln PUD, Newport
6	6	2	2	3	3	0	[3]	14,750	14,006	Cheyenne LF&P
61	45	16	14	216	194	1	1	25,007	23,385	Colorado Central Power
1	2	1	1	1	1	...	...	2,523	2,454	Elko Lamoille Power
190	194	...	...	...	...	502[9]	503[9]	75,747	71,220	El Paso Elec.
5	5	1	1	30	45	0	[3]	5,383	5,117	Fairbanks Municipal Utilities
190	187	1	...	0	...	0	...	6,782	6,622	Fort Collins L&P Dept.
...	...	331	307	...	...	...	...	94,915	90,576	Hawaiian Elec.
...	...	3	3	...	...	1	1	1,454	1,456	Heber L&P
0	0	1	1	3	3	...	...	1,254	1,244	Helper City L&P
252	263	1	1	1	...	...	...	16,068	16,003	Hilo Electric Light
13	14	32	10	12[18]	...	...	...	13,807	13,423	Home L&P, Greeley
...	...	...	...	...	...	...	...	...	...	
75	99	145	139	...	...	5	5	123,989	121,814	Idaho Power
907	891	25	26	7	9	1	2	26,584	25,842	Imperial Irrig. Dist.
168	108	154	108	92	74	...	...	75,811	65,330	Intermountain Rural Elec. Assn.
5	6	1	1	1	1	[3]	0	3,142	3,139	Ketchikan PU
15	15	4	4	1	1	3	3	3,012	3,016	Lamar L&P Dept.
8,910[23]	...	1,643	...	...	...	2	...	813,098[23]	...	Los Angeles Dept. of W&P
10	[3]	...	...	...	...	...	...	1,436	1,422	Matanuska Elec. Assn., Palmer
...	...	94	91	...	...	...	...	10,500	10,490	Maui Elec.
64	56	3	3	0	0	0	0	1,434	1,319	Mineral County Power System
731	732	29	29	98	96	1	1	24,906	23,802	Modesto Irrig. Dist.
2,392	2,294	439	402	11	10	55	52	137,235	132,741	Montana Power
27	23	16	16	...	...	...	...	4,246	4,129	Mountain View Elec. Assn.
270	244	...	...	124†	119†	[3]	0	9,296	8,600	N. M. Elec. Service
14	7	0	0	337[15]	275[15]	90[16]	90[16]	3,059	2,847	Northern Lights
16	...	[3]	...	64[19]	...	...	...	2,537	...	Otero County Elec. Co-op.
37,119	36,630	900	866	25	23	36[20]	36[20]	1,692,997	1,612,263	PG and E
3,901	4,304	...	...	781†	790†	8	[3]	270,431	266,414	Pacific P&L
...	...	1[12]	1[12]	0	0	0	0	15,418	13,438	Palo Alto MU
53	50	...	...	...	...	206[9]	168[9]	46,928	46,719	Pasadena L&P Dept.
9	10	1	1	16	16	...	...	5,680	5,499	Port Angeles L&P
72[5]	67	204	191	1,082	1,102	1[6]	1[6]	231,187	225,518	Portland GE
...	...	...	...	...	...	...	...	3,793	3,613	Poudre Valley Rural Elec. Assn.
47	14	2	5	...	...	...	...	8,837	8,557	Provo Dept. of Utilities
7,258	7,241	95	83	1,126	1,035	7	10	274,665	257,566	PS of Colorado
...	...	7	8	12	12	...	...	78,507	74,587	PS of N. M.
75	71	14	10	...	...	...	...	8,918	8,382	PUD of Benton County, Wash.
1[18]	1[18]	...	...	...	...	...	...	...	...	
34	31	10	[3]	5	7	4	3	13,641	12,226	PUD No. 1 of Chelan County, Wash.
9	8	...	...	...	...	127[9]	118[9]	30,168	29,494	PUD No. 1 of Clark County, Wash.
7	8	9	7	2	3	1	1	20,663	20,081	PUD No. 1 of Cowlitz Co. Wash.
...	...	24	23	8	7	...	...	12,259	10,199	PUD No. 2 of Grant County, Wash.
27	19	21	14	310	300	1	1	20,671	20,131	PUD No. 1 of Grays Harbor Co. Wash.
46	44	13	13	301	289	...	...	11,855	11,731	PUD No. 1 of Lewis County, Wash.
1	1	8	7	6	6	...	...	5,699	5,479	PUD No. 3 of Mason County, Wash.
...	...	9	9	14	...	1	1	8,470	8,235	PUD No. 1 of Okanogan Co. Wash.
[3]	[3]	6	6	127	121	...	...	7,247	7,109	PUD No. 2 of Pacific County, Wash.
116	114	16	15	28	23	2	2	51,851	48,650	PUD No. 1 of Snohomish Co. Wash.
298	327	139	129	155	148	11	12	183,953	176,272	Puget Sound P&L
297	280	1	1	0	[3]	0	0	3,103	3,005	Raton PS
697	665	...	...	...	...	...	...	24,116	22,579	Riverside PU Dept.
578	446	93	90	[3]	0	1	1	122,769	114,043	Sacramento MUD
270	260	...	5	66	126	91[9]	6	47,050	39,923	Salt River Power Dist.
...	...	99	231	107	13	9	10	250,139	238,265	San Diego G&E
241	315	3	3	1,037	1,136	8[6]	21[6]	222,720	216,576	Seattle Lighting Dept.
86	87	...	...	...	...	...	...	33,544	31,319	Sierra Pacific Power
20	17	8	8	151[19]	69[19]	368[11]	296[11]	6,289	6,340	Southeast Colorado Power Assn.
29,659	27,266	2	2	10,318	9,755	8	8	1,307,648	1,224,870	Southern Calif. Edison
93[5]	91[5]	154	146	24[15]	22[15]	7	7	43,898	42,754	Southern Colorado Power
1,801	1,730	101	102	943	900	91	89	170,811	163,521	Southwestern PS
7	5	6	6	...	...	1	1	2,218	2,058	Springer Elec. Co-op.
1,269	1,254	31	27	9	18	18	681	57,635	59,133	Tacoma PU Dept.
26	22	37	38	244	248	15	15	9,291	9,398	Telluride Power
115[13]	100[13]	6	6	0	0	...	...	59,242	55,728	Tucson G&LP
55	53	13	13	39	39	1	2	18,548	17,857	Turlock Irrig. Dist.
5	[3]	5	5	...	...	...	...	1,353	1,405	Uintah P&L
2,971	2,607	406	381	67	71	34	36	195,736	189,702	Utah P&L[22]
11	12	3	3	59	59	139	133	1,912	1,922	Vigilante Elec. Co-op.
693	694	...	...	229†	229†	...	...	132,564	129,229	Washington Water Power
3	4	5	5	59	59	0	0	2,397	2,347	Yellowstone Valley Elec. Co-op.

[3] Included with other totals. [4] General commercial and industrial. [5] Large. [6] Railroads. [7] Less than 100,000 kwh. [8] Over 600 kw demand. [9] Miscellaneous. pumping. [19] Includes schools and churches. [20] Includes railway power. [21] Under bi-monthly billing since April 1955. [22] Includes Western Colorado Power Co.

Appliance Sales

	Domestic Customers	Refrigerators	Ranges	Water Heaters	Freezers	CLM Lamp Sales	Room Conditioners	Washers Automatic	Washers Conventional
ALASKA									
Ketchikan PU	2,250	100	100	75	35	...	...	75	25
Matanuska Elec. Assn., Palmer	990	82	90	30	31	...	...	26	15
ARIZONA									
Arizona PS, Phoenix	114,306	11,596	2,297	890	1,623	26,970	3,360	9,637	4,947
Salt River Power Dist., Phoenix	42,853	480	296	87	295	...	1,368[4]	325	200
Tucson GEL&P	50,322	3,500	825	250	600	...	300	3,000	1,000
BRITISH COLUMBIA									
B. C. Elec., Vancouver	196,082††	18,750	12,644	13,460	712	...	...	4,609	10,056
B. C. Elec., Victoria	40,272††	3,299	1,901	455	669	5,307	...	983	1,380
B. C. Power Com., Victoria	50,900	...	2,400	2,500	...	...	...	...	...
CALIFORNIA									
Alameda PU Dept.	13,451	250	250	10	100	...	...	200	50
Burbank PS Dept.	30,300	300	250	15	20	...	450	350	110
Calif. Elec. Power	70,577	2,990	568	280	140	...	325	3,050	750
Calif.-Pacific Utilities	22,066	1,185	1,067	820	776	...	150	1,250	950
Imperial Irrig. Dist.	20,771	1,600	600	230	250	...	2,000	1,400	850
Los Angeles Dept. of W&P	679,308	...	4,500	1,900	...	...	...	...	...
PG and E	1,082,471	87,628	37,685	8,729	17,616	...	5,221	100,670	21,347
Pasadena L&P Dept.	40,588	...	599	46	...	...	...	...	...
Riverside PU Dept.	21,441	...	786	21	...	...	...	...	...
Sacramento MUD	104,575	8,058	5,367	1,021	1,819	...	2,314	11,951	2,037
San Diego G&E	162,934	16,500	3,025	2,405	4,875	...	...	15,600	...
Southern Calif. Edison	1,111,570	10,841	17,219	1,974	...	...	411	12,257	...
COLORADO									
Colorado Central Power	22,858[5]	425	450	100	200	...	...	350	...
Fort Collins L&P Dept.	5,626	300	250	25	200	...	100	150	200
Intermountain Rural Elec. Assn.	24,738	50	76	59	28	...	18	22	6
Lamar L&P Dept.	2,378	100	75	30	100	...	15	75	15
Mountain View Elec. Assn.	1,056	...	74	83	...	...	...	...	...
PS of Colorado	236,365††	21,000	10,300	3,000	4,500	5,000	2,500	24,000	9,000
Southeast Colorado Power Assn.	1,130	100	73	50	125	...	20	50	...
Southern Colorado Power	33,559	1,868	620	140	439	541	137	2,046	1,017
HAWAII									
Hawaiian Elec.	79,348	5,800	3,833	3,614	2,233	...	95	6,200	1,100
Hilo Elec. Light	5,884	400	400	300	100	...	...	175	200
Maui Elec.	8,591	229	262	207	175	...	4	298	276
IDAHO									
Idaho Power	76,610	8,000	8,328	7,652	4,676	2,000	600	5,200	400
Northern Lights	2,422††	101	136	152	161	...	...	70	10
MONTANA									
Montana Power	117,332	8,100	5,700	1,400	3,800	2,362†	220	9,000	...
Sheridan County Elec. Co-op.	...	...	...	...	...	...	...	...	...
NEVADA									
Sierra Pacific Power	28,502	1,994	1,120	922	307	...	...	...	...
NEW MEXICO									
N. M. Elec. Service, Hobbs	7,586	703	210	10	524	...	150	830	115
Otero County Elec. Co-op.	773	20	12	25	20	...	...	20	15
PS of N. M.	68,339	5,746	2,139	328	1,894	...	...	4,728	2,192
OREGON									
Calif. Oregon Power	69,510	3,600	3,300	3,500	2,000	...	4,700[5]	4,200	750
Central Lincoln PUD	9,152	157	504	496	757	...	37	604	64
Pacific P&L	203,034	21,933	24,524	12,126	10,241	...	418	33,912	9,092
Portland GE	203,742	13,200	15,250	7,850	6,500	...	60	21,760	4,000
TEXAS									
El Paso Elec.	66,237	7,506	2,668	2,348	1,429	...	1,367	...	...
Southwestern PS	129,491	12,499	4,240	625	6,091	...	1,301	17,677	2,636
UTAH									
Helper City L&P	1,000	40	50	40	30	...	20	50	5
Provo Dept. of Utilities	7,711	616	542	72	164	...	43	566	221
Telluride Power	7,437††	217	337	357	144	...	...	283	...
Uintah P&L	1,055	50	25	30	15	...	15	50	25
Utah P&L	174,778	11,716	11,731	5,669	4,477	...	482[2] 4,252[3]	13,307	5,552
WASHINGTON									
Chelan County PUD No. 1	8,087	840	1,005	1,019	388	...	18	967	238
Clark County PUD No. 1	27,045††	1,000	1,000	1,500	500	...	50	1,500	100
Cowlitz County PUD No. 1	18,373	176	239	71	52	0	0	244	18
Grays Harbor County PUD No. 1	17,088††	...	772	850	...	...	...	...	...
Mason County PUD No. 3	5,134	237	211	236	14	...	...	64	...
Pacific County PUD No. 2	5,845	200	230	260	90	...	...	530	90
Port Angeles L&P	4,793††	60	50	60	40	...	...	100	50
Puget Sound P&L	166,048	7,732	8,485	6,056	2,470	...	...	10,767	1,804
Seattle Lighting Dept.	195,876	9,000	13,000	10,000	4,000	...	...	15,000	...
Snohomish County PUD No. 1	47,219††	3,200	3,200	3,200	700	...	10	1,600	500
Tacoma Dept. of PU	50,553	4,780	5,675	3,200	1,050	...	...	2,950	1,120
Washington Water Power	96,746	10,148	10,570	6,929	4,799	...	731	11,304	3,492
WYOMING									
Cheyenne LF&P	12,683	750	500	50	550	700	100	1,500	500

* Distributor builder sales division. † Company only. ** Survey conducted March 1955. ‡ Selectively. †† Includes rural. § 40% rural. [2] Includes Western Colo. [3] Actual figures. [4] Includes rural-commercial. [5] Limited.

are actual. Tacoma City Light's kwh consumption figure for 1955—8,504—is not comparable with previous years because bimonthly billing was initiated in April 1955.

Grant County PUD does not now have appliance sales figures but is making a saturation study, which it hopes to have in booklet form by the end of March. Appliance sales figures given by Central Lincoln PUD of Newport, Ore., originated with a saturation survey conducted in March 1955.

Although it has no separate record of CLM lamp sales, dealers in the area served by Utah Power & Light and its subsidiary, Western Colorado Power, report 42,868 portable lamps of all types. Montana Power Co.'s figure on CLM lamps refers to company sales only.

Although it has no report on appliance sales, Vigilante Electric Co-op. reports that it plans to start the idea with area dealers.

Northern Lights of Sandpoint, Idaho, reports that it has used a loan program which has stimulated growth considerably.

Hawaiian Electric Co. merchandises through Honolulu Electrical Products Co. Ltd., a wholly owned subsidiary.

Southern Colorado Power Co. ex-

Appliance Sales

Ironers	Dryers	Vacuum Cleaners	Dishwashers	Waste Disposers	Radio	Television	Utility Merchandise Yes	Utility Merchandise No	Appliance Sales Estimated	Appliance Sales Dealer Reports	
											ALASKA
6	75	100	6	10	200	25		X	X		Ketchikan PU
...	13	...	...	...	28	63		X		X	Matanuska Elec. Assn., Palmer
											ARIZONA
459	810	...	783	688	13,449	20,109		X		X	Arizona PS, Phoenix
66	131	...	276	200	...	960		X	X		Salt River Power Dist., Phoenix
100	175	700	325	200	2,000	7,000		X	X	X	Tucson GE&P
											BRITISH COLUMBIA
308	2,941	12,560	450	150	17,650	50,980		X		X	B. C. Elec., Vancouver
36	355	2,329	69	26	2,436	9,612		X		X	B. C. Elec., Victoria
...	...	...	...	...	...	...		X	X		B. C. Power Com., Victoria
											CALIFORNIA
50	100	200	100	25	300	400		X	X		Alameda PU Dept.
20	200	100	50	225	250	1,100		X	X		Burbank PS Dept.
35	130	...	20	...	...	...	X		X	X	Calif. Elec. Power
590	753	3,500	210	260	...	...		X	X	X	Calif.-Pacific Utilities
50	100	...	...	...	...	...		X	X		Imperial Irrig. Dist.
...	8,000	...	...	...	...	...		X	X		Los Angeles Dept. of W&P
3,833	33,252	...	12,977	15,694	99,472	...		X		X	PG and E
...	...	...	...	...	...	...		X			Pasadena L&P Dept.
...	...	...	...	...	...	...		X		X[7]	Riverside PU Dept.
366	6,939	3,405	1,652	1,944	8,181	19,500		X		X	Sacramento MUD
...	...	...	...	7,700	35,000	46,175		X		X	San Diego G&E
...	12,446	...	14,202	13,790	...	...		X		X[8]	Southern Calif. Edison
											COLORADO
...	300	...	...	...	...	...		X	X		Colorado Central Power
100	200	300	200	100	...	...		X	X		Fort Collins L&P Dept.
12	26	12	25	29	30	90		X	X		Intermountain Rural Elec. Assn.
20	10	120	10	10	300	60		X	X		Lamar L&P Dept.
...	43	...	...	...	...	...		X		X	Mountain View Elec. Assn.
2,000	7,500	...	...	...	...	32,000	X		X		PS of Colorado
...	50	...	...	...	...	...	X		X		Southeast Colorado Power Assn.
56	607	904	91	836	2,151	3,411	X		X	X	Southern Colorado Power
											HAWAII
500	660	...	607	1,000	...	...		X	X	X	Hawaiian Elec.
15	50	...	30	25	...	3,000		X	X		Hilo Elec. Light
...	18	...	33	...	...	3,000	X		X		Maui Elec.
											IDAHO
700	5,441	2,000	600	400	6,000	5,000	X[9]		X	X	Idaho Power
2	89	...	12	...	...	99		X		X	Northern Lights
											MONTANA
...	5,600	...	...	...	...	...		X	X		Montana Power
...	...	...	...	...	...	...					Sheridan County Elec. Co-op.
											NEVADA
...	...	...	...	...	...	...		X		X	Sierra Pacific Power
											NEW MEXICO
18	90	105	25	25	...	850		X	X	X	N. M. Elec. Service, Hobbs
...	20	...	...	...	10	50	X		X		Otero County Elec. Co-op.
791	711	...	304	186	...	11,321		X		X	PS of N. M.
											OREGON
200	3,500	...	600	280	...	7,500					Calif. Oregon Power
96	779	...	155	119	56	1,420		X		X**	Central Lincoln PUD
1,198	24,542	...	2,348	797	31,671	48,714		X		X	Pacific P&L
1,000	16,800	...	1,250	800	17,500	25,600		X	X		Portland GE
											TEXAS
...	681	...	467	...	...	15,337	X			X	El Paso Elec.
743	5,436	...	994	...	...	23,238		X		X	Southwestern PS
											UTAH
25	40	250	10	10	20	300		X		X	Helper City L&P
196	370	430	46	59	914	1,050		X		X	Provo Dept. of Utilities
...	62	...	...	...	...	...		X		X	Telluride Power
...	10	15	2	...	10	...		X	X		Uintah P&L
2,110	5,987	17,817	1,252	1,984	17,962	20,946		X		X	Utah P&L
											WASHINGTON
44	662	412	172	104	1,520	4,109		X	X		Chelan County PUD No. 1
100	1,500	1,000	100	180	1,000	3,000		X	X		Clark County PUD No. 1
14	155	67	13	6	225	354		X		X	Cowlitz County PUD No. 1
...	...	...	...	...	...	...		X	X		Grays Harbor County PUD No. 1
...	64	...	21	10	47	210	X		X		Mason County PUD No. 3
60	400	120	70	30	500	500		X	X		Pacific County PUD No. 2
50	75	100	40	50	100	250		X	X		Port Angeles L&P
253	7,584	...	1,018	292	...	13,381		X	X	X	Puget Sound P&L
...	10,000	...	...	...	...	...	X[9]		X		Seattle Lighting Dept.
200	1,000	2,500	1,300	500	3,000	4,000		X	X		Snohomish County PUD No. 1
...	4,100	...	...	...	...	7,200		X	X		Tacoma Dept. of PU
571	7,919	7,635	1,358	589	11,580	20,680		X		X	Washington Water Power
											WYOMING
100	300	300	100	150	1,400	1,500	X‡		X		Cheyenne LF&P

Power Co. [2] Compressor. [3] Evaporative. [4] Includes 1,113 central units, 3 hp and over. [5] Electric heaters, estimated 9,400 kw. [6] Commercial water heating only.

plains that all dealers do not report on sales. Pacific Power & Light Co. appliance sales figures are taken from reports of 636 dealers in its territory.

Southeast Colorado Power Assn. transferred 493 customers to San Isabel Electric Assn. at Pueblo in October 1955 and reports that the comparison of 1954-55 figures is thrown off to this extent.

Entire electric rate tariffs of San Diego Gas & Electric Co. were revised in August 1955 by California PUC order. In the new domestic or residential rate schedules there is a clause permitting an apartment house or group of apartments or a bungalow court on a single premise to take service on this schedule by applying a multiplier to the energy blocks of the schedule, the multiplier being equal to the number of single-family accommodations on the meter. In quite a few cases, it was more economical for the customer to transfer from commercial to domestic service. As of Dec. 31, 2,489 former commercial customers had transferred to the residential classification and 617 to the rural classifications. For purposes of uniformity, these customers have been removed from residential and rural classes and added to the commercial and industrial class so that

the growth of 1955 over 1954 is correctly shown. Also in August a standard company-wide procedure on how to count street lights as customers was placed into effect, reducing customer count. Likewise the Public Authorities was increased to 107 accounts, where before these 107 meters had been combined in 13 accounts.

Southern California Edison Co. sales figures are compiled from distributors' builder sales divisions only. No figures are available on other appliances or on additional unit sales by dealers or distributors.

Los Angeles Department of Water & Power reports that it has reasonably accurate records on ranges, water heaters and dryers only; depends on national figures for basic data in estimating sales of appliances on its lines, necessitating a time lag of four months after the close of the year. The number of customers listed for 1955 is for the Los Angeles area and does not include the Inyo-Mono part of the system. The comparison figures for 1954 have been omitted because of a change to bimonthly billing of commercial and industrial customers in December of that year.

Residential Use Up

Calling attention to growth of residential electric use in its territory, California-Pacific Utilities Co. reports that in 1955 residential customers increased their average annual use by 512 kwh or 10.3% instead of the 9% estimated in February. Average kwh per residential customer was 1,276 in 1945, 3,322 in 1950, 5,464 in 1955. Five-year increase, 1945-50, was 160.2%; from 1950-55, 64.5%. Increase 1945-1955 was 329%. Total number of major appliance units sold last year on rural areas served increased by 13.3%.

Sacramento MUD, in addition to a major effort on promotion of electric ranges, has added two-zone refrigerators to the list of appliances meriting major support during 1956.

Although Okanogan County PUD does not give appliance sales figures, it says that they were about the average.

Bountiful City (Utah) Power & Light Co. says it has no way of knowing appliance sales figures because local merchants sell only a fraction of the units added to its lines each year, an undetermined number being purchased from Salt Lake City.

Portland General Electric comments that it maintains an active program of appliance sales promotion and that estimates listed are drawn from a casual survey of cooperating dealers.

Gross kwh sales and revenue in 1955 were about 3½% above 1954 in territory served by Ctiy of Lamar, Colo.

Electrical Bureau Sponsors

Sales Workshop

To help salesmen meet today's intense competition both within and outside the industry, Northern California Electrical Bureau is sponsoring a series of Sales Workshops during March and April. The following schedule was announced by LeRoy R. Bennett.

Fresno, March 12 through 15, with cooperating sponsors including City & County Chambers of Commerce, Motor Car Dealers Assn., Fresno Appliance & TV Dealers Assn., PG and E.

Stockton, March 19, 26, April 2, 9.

San Francisco, March 20 through 23. Cooperating sponsors: Northern California Electrical Bureau and electrical industry.

Oakland, April 3, 5, 10, 12. Cooperating sponsors: Oakland Sales Executives Assn. and Northern California Electrical Bureau.

Santa Rosa, April 4, 6, 11, 13. Northern California Electrical Bureau.

Sacramento, April 17 through 20. Sponsors: Sacramento Valley Electric League and Northern California Electrical Bureau.

The workshops will be tailored to the type of enrollment and problems of the locality in which they are held. They are practical, intensive and necessary, according to Bennett. Enrollment is $15 for four evenings, with approximately 10 hours of instruction.

When it recommended the sales workshops, the bureau's executive committee specified that the man chosen to conduct them must have a well established background in the field of competitive selling. Ben Franklin Bills was chosen from a large number of selling specialists because he seemed most qualified to do intensive practical training, Bennett said. The bureau is standing behind the workshops with the guarantee of satisfaction to the enrollee or return of his enrollment fee.

Bills has a diversified background of experience in business and law. He progressed from a country banker to officer in charge of new business of the Trust Co. of the Continental and Commercial Banks of Chicago. He has been director of sales in a bond house with national distribution and whose volume was increased three-fold in three years. He established the Bills Security, Mortgage, Real Estate, Construction and Lumber companies. He has for many years been president of Land Developers Inc.

He is the author of books on selling and allied subjects and has produced a number of training films, including *Persuasion Makes the World Go Round* and *Persuaded—Sold.*

A new attendance record was set at the Monterey Bay Appliance Dealers meeting Jan. 30, when 247 attended this sixth annual meeting of the Tri-County group. Dealers came from all parts of Monterey, Santa Cruz and San Benito Counties to renew friendships, exchange ideas and hear the featured speaker—A. J. McCollum—discuss "Creating the Climate of a Sale" through tie-in advertising with utility and industrial programs. In the picture from left are: McCollum, manager of advertising and publicity, PG and E; Dick Searle, president, Monterey Peninsula Gas & Electric Appliance Dealers Assn., Monterery; Walter Brooks, president, Salinas Valley Gas & Electric Appliance Dealers, Soledad; D. F. Nock, commercial manager, Coast Valleys Division, PG and E, Salinas, master of ceremonies; Ellis Langley, dealer representative, PG and E Coast Valleys Division, Salinas; Milo Cain, dealer representative, PG and E San Jose Division, Santa Cruz

ELECTRICAL WEST SALES GUIDE © MARCH 1956

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

Market active

It was a busy Market Week in San Francisco, with attendance up 30% and orders about 25% above the 1955 winter level. Although many electrical lines had already been shown and orders placed, there was plenty of activity on the floors devoted to appliances, radio and TV. Demonstration of Tappan's electronic range drew a crowd at every showing; amazed many who saw food come out piping hot while oven and cooking dishes remained cool. Among other attention getters were Philco's elevator oven and stack-up units; Thermador's twin ovens and kitchen heater; Crosley's pink kitchen; the Bendix power surge automatic washer; Gibson's vertical broiler; G-E Telechron's cordless clock; Easy's 27-in. combination.

To come

Hotpoint reported that it would have its electronic oven on the market about August; had not yet set the price. It will also introduce a full line of black and white TV in July, with screen sizes ranging from 14 to 24 in.

Color choice

Westinghouse is ready with a wide variety of color combinations and a plan to help the housewife select the ones she likes best. In the TV field, this manufacturer has announced a color set with a 22-in. rectangular all-glass tube. It plans to start production about mid-year.

Summer market

Summer Market at San Francisco's Merchandise Mart will be held Monday through Friday, July 16-20.

Big show

Two shows will be merged into one big event when the AMA, PHBA and ABC put on a combined spring fair and home show at the State Fair Grounds in Phoenix, April 14-22.

Fair trade actions

A supreme court test of Oregon's fair trade law has become important to two more appliance businesses. In court actions brought by Sunbeam, Fred Meyer retail chain and General Sales Corp., both in Portland, have been restrained from selling, or offering for sale, Sunbeam appliances below listed prices. Sunbeam is asking $100,000 exemplary damages and $50,000 compensatory damages from Fred Meyer and $25,000 and $50,000 from General Sales Co. for selling appliances below list. General Sales is a distributor that Sunbeam charges is associated with Meyer. In the meantime, a decision is expected soon on General Electric Co.'s supreme court appeal of a ruling that the fair trade law's nonsigner clause is unconstitutional. Fred Meyer has not signed a fair trade contract with Sunbeam.

Thomson-Diggs, which recently consolidated its major appliance division into its hardware division and gave up its San Francisco headquarters, reported from Sacramento that it had dropped the G-E table appliance line because of reduced profit margins. President C. L. Mason wrote customers warning that other manufacturers might follow suit if the "experiment" gained support of wholesalers and retailers; reports response from 50 retailers who object to reduced margins while costs are going up. Thomson-Diggs does a $2,000,000 volume annually on electric housewares; has more than 3,500 customers in the retail field.

Drops line

At San Bernardino, Calif., Schweitzer's decided that discounters were making it unprofitable to carry on its major appliance and TV business; said it would drop those lines. Although housewares were to be continued, projected expansion of the electric housewares section had not been started because of discounters and low margins, it was reported.

Blames discounters

Business neighbors of Harold Kelley's new Appliance Center in Portland helped him promote his grand opening by staying open at night and offering special buyer attractions. Details will be reported later, but the cooperative effort brought 23,000 visitors to the store.

Good neighbors

Sacramento Municipal Utility District is sponsoring its second annual bonus bulb campaign. SMUD sells customers cartons of three and four 100-w bulbs. When the empty carton is returned the customer receives a free 150-w bulb. It is part of the district's "Better Light--Better Sight" campaign.

Light bulb bonus

The electric range modernization promotion sponsored by Northern California Electrical Bureau is getting results. PG and E bill enclosures sent to all-electric areas urged customers to modernize old ranges with new low-cost, high-speed surface units; carried a coupon. At the end of the first two weeks--with only part of the bill enclosures sent--168 coupons had been returned and more were coming in. Included with the returns was one long-distance phone call from a man who had learned for the first time that a range could be modernized.

Help for old ranges

Montana Power Co. helps with cash when urban customers want new appliances. Coupons given in Great Falls and Billings divisions are worth $25 or $10, depending on the appliance, when presented to a dealer at time of purchase. This load-building campaign will be detailed in a later issue.

Cash help

An unfortunate oil-line break and fire at Portland Gas & Coke's main generator room disabled 12 oil-gas generators Feb. 24. About 61,000 customers of the company, badly in need of heating and cooking facilities during the outage, probably created record loads for electric utilities in the area. The sudden load brought out warnings from the companies against overloading circuits with heating units.

Bad break

NEMA's Electric Range Section has put out a new edition of its booklet, "Planning the Modern Home Economics Department." Copies may be secured from National Electrical Manufacturers Assn., 155 E. 44th St., New York 17.

New edition

New rules filed on extensions

New extension rules filed with the California Commission by the gas companies in southern California decrease free length allowances materially. The proposed order entirely changes allowances in real estate subdivisions and tracts, providing added allowance when the builder agrees to install all-gas appliances, particularly built-in ranges instead of all-electric or partially gas and partially electric. The new plan is to replace the present policy under which the gas companies have been charging builders $55 per lot where homes were all-electric. First commission hearing was held in Los Angeles Feb. 17. The gas companies were asked to present at a later hearing a comparison of extension costs to builders and customers under the old and new rules.

Crack down

Federal Communication Commission is cracking down on radio and TV interference, not only that produced by electric lines (see p 86) but from receivers as well. A new rule provides limitations on the amount of permissible radiation from FM, television, AM and mobile receivers. After May 1, 1956, all purchased receivers must have attached a FCC certification seal of approval. This ruling will affect all new domestic industry receivers and particularly applies to mobile service radio equipment.

Results

Three years of negotiations between Appliance Parts Jobbers Assn. and the National Classification Board of the trucking industry have resulted in a 25% lower rate class for metal home laundry machine parts. Money savings will be about 15%.

"Only a breather"

Speaking in San Francisco before the Hardware Dealers Assn., William J. Cheyney, executive vice-president, National Foundation for Consumer Credit, said that the leveling of consumer credit that will be seen in 1956 is only a breather. Credit will start up again in 1957, he predicted, stating that the 8,000,000 families in the $3,000 to $7,000 income bracket not now using their credit will spend it on household goods.

Rosy forecast

We do a favor by selling the idea that last year's model is not good enough, Don Mitchell, Sylvania president, told the San Francisco Sales Executives' Assn. recently. He predicted that we will have a gross national product of $500 billion by 1960; of $800 billion by 1980. The only fear is that we won't be able to make and install high-speed automatic equipment fast enough and will be faced by actual labor shortage before 1980, he said.

Mergers

Magnavox has purchased Sentinel Radio Corp., subject to approval by two-thirds of Sentinel stockholders. It also has taken over the Sparton radio and television service of Sparks-Withington Co. . . . Hupp Corp. has bought 60% of the stock of Gibson Refrigerator Co. as the Hupp expansion in the appliance field continues . . . A merger of Mullins Mfg. Corp., makers of Youngstown Kitchens, and American Radiator and Standard Sanitary Corp. has stockholder approval.

Early bird winner

General Electric's "Early Bird" distributor fan sales award was won for the fourth time by Arizona Wholesale Supply Co. Competition was with distributors in California, Arizona and Hawaii.

About people

Ralph Stoddard, formerly with Frank Edwards Co., has joined Tommy Ryan in the Ryan Distributing Co.; will work in the northern California area . . . Frances M. Michael takes over as manager of Hotpoint Home Economics Institute as Helen Kirtland directs special activities in connection with the "Live Better Electrically" program . . . Byron Brown is color TV sales promotion manager for Hoffman, with headquarters in Los Angeles . . . Edna Poynter has been made Western regional home economist for Norge. Her territory will include California, Arizona, Montana, Oregon, Idaho and Washington.

More news of people

Robert L. Allen is district manager of Westinghouse portable appliances in Washington, with headquarters at Seattle . . . Gordon J. Layman is heading up the commercial department of Kelvinator at the Oakland headquarters . . . John Chadwell is new general sales manager of all Hoffman sales divisions. He will be succeeded in Fresno by Norfleet Callicott . . . The company has also announced the appointment of C. E. Schick as field sales engineer for Hoffman Radio Division.

Notes on the trade

Frank Edwards Co., San Francisco, was one of 18 trophy winners in a national Lewyt Corp. distributors sales contest . . . Kierluff & Co., Maywood, Calif., is new southern California distributor of Sonic Servant for Sonic Specialties Inc. The product is a combination radio and intercom system for homes or small businesses . . . Canadian General Electric has opened a new $750,000 office and warehouse in Vancouver. Building has a showroom, auditorium and full line of consumer products . . . A sales office has been opened in Seattle by Collins Radio Co. to serve the Northwest area. It is at 1318 Fourth Ave. . . . New full line distributor of Gibson Refrigerator in Spokane is Roberts & Knapp, E. 210 Boone St. . . . Inland Empire Wholesalers, Spokane, has been franchised to distribute CBS television and radio receivers . . . A new distributor for the laundry line of Whirlpool-Seeger Corp. in the West is Midland Specialty Co., El Paso, with a branch at Phoenix . . . Sues, Young & Brown, Los Angeles, announces a 1956 sales quota that is 50% higher than 1955's sales volume . . . Philco-Los Angeles has formed Appliance Specialty Division for better customer service. It divides radios, etc., from appliances.

Promotion plan

Pioneer Appliance Co., San Francisco, new distributor of Lewyt air conditioners in northern California, has instituted a promotion program that will allow home builders in that area and in Reno to take orders for the new units. A specially designed unit fits into the outside wall of a room, and it is reported that 50 of them will be placed in model homes representing several thousand homes in subdivision projects. The units can be included in FHA mortgages. Available in various capacities.

New products

Three RCA Whirlpool room air conditioners have electronic air filters. Air-borne particles are "grabbed" by an electronic charge and held . . . Toastmaster Products is introducing a square electric fry pan said to have a highly sensitive thermostat . . . Newest addition to the L&H line of built-in electric ovens is called "Classic," and includes recessed infrared smokeless broiler and other features . . . Raytheon now as a Rollabout TV cart for M-1760-E 17-in. table model sets.

WHY....
"SPRING LOADED" FARGO HOT LINE CLAMPS are "STANDARD"

A heavy, vanadium steel spring compensates for conductor cold flow while under pressure and variables due to changing loads, fault currents and vibration.

"Vise Type" design with the two parts interlocking, increases the strength of the clamp (The clamp design follows the principle of the common bench vise).

Extra wide jaws increases conductor contact minimizing conductor cold flow by reducing the pressure per unit area. Larger heat radiating surfaces holds joint temperatures down. The wide jaws assure good electrical interconnection between strands because every strand of the rated conductors will be under at least one pressure zone.

Small conductors cannot be locked behind the jaws thereby eliminating the danger of a poor connection.

Completely enclosed greased threads are protected against weathering and may easily be loosened after long exposures.

Large "ears" or "lugs" assure a positive grip in all makes of hot sticks.

The thermal expansion of both jaws is equal as they are cast in "like" metals. In the aluminum or plated aluminum Fargo hot line clamps both jaws are aluminum and in the bronze clamp both jaws are bronze to assure uniform expansion when subjected to varying loads and temperatures.

Fargo hot line clamps are available in bronze, plated bronze, aluminum or plated aluminum to handle all combinations of conductors from 8 sol. to 397,500 ACSR plus rods.

The four sizes of the "AGE-Series" permit the most economical selection of clamps.

Ask your Line Material Field Engineer for complete details.

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Manufactured by
FARGO MFG. COMPANY, INC.
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Los Angeles

Want Federal Power

Local public agencies in California want Congress to make available to them the right to purchase electrical energy generated by the falling water from the Trinity River project and other federal projects that may be constructed in California; transmission facilities to be provided where necessary to transport power generated by the falling water to these public agencies in California.

This resolution to Congress was one of the important actions taken by the California Municipal Utilities Assn. at its annual meeting held in Los Angeles Feb. 15-17. Other resolutions reaffirmed the association's opposition to the Central Arizona project; expressed opposition to the Upper Colorado River storage bills now pending before Congress; asked Governor Knight to call an extraordinary session of the state legislature to act on legislation to create a state water department, appropriate money to acquire the Oroville and San Luis dam and reservoir sites, and for needed surveys in connection with the Feather River project.

At the business session where these actions were taken Carl L. Richey, Sacramento MUD, and Paul Beermann, San Diego, were re-elected president and vice-president, respectively, for second terms. G. A. Baxter, Alameda, was reappointed treasurer and F. V. Frey, Pasadena, reappointed secretary.

Those attending open sessions heard discussions on water problems, atomic power, administrative, personnel, financial and public relations problems.

Thorium Promising

Dr. A. B. Martin, North American Aviation, said atomic power plants will cost $300 per kw; fuel cost will be 10 to 12 mills; availability of uranium is not a deterrent (about equal to present known coal reserves); there is a new interest in thorium because U233 is produced in the fission process; that the next few months will prove out some of the reactor types under study by the AEC.

State Senator Edwin J. Regan, discussing the California water problem, said that bonds cannot be issued for the Feather River or any other California project until the U. S. Supreme Court decision on the Pelton case in Oregon is changed or there is an act of Congress changing that decision. Lawyers believe that the Pelton decision sets aside long-established water law and gives the federal government jurisdiction over practically all state waters. Regan opposes any special session of the state legislature on water matters until a thorough long-range study has been made and legislators are in possession of all facts. He made the revealing statement that southern California would get only 1,500,000 acre-ft of water from the Feather River project, leaving the area with a deficiency of 6,800,000 acre-ft when present sources have been fully utilized.

Speaking of new developments in revenue bonds, Attorney James L. Beebe said that 1955 amendments to the Revenue Bond Act of 1941 give California cities and districts a desirable freedom in revenue bond financing.

Residential Underground

Residential underground was chief electrical topic at an evening panel session. Earl A. Finley, Pasadena, described a recent underground system that cost the subdivider only $150 per lot for duct system, pull boxes and manholes. The city utility provides service to the secondary pull boxes at its own expense. Walter Heston, ELECTRICAL WEST, suggested that utilities take a new and fresh look at the residential underground problem and that consideration be given to a 480-v or higher primary voltage serving a load center with dry-type transformer on the customer's premises; further, that management give consideration to financing tract residential underground by a special rate or by a surcharge on the customers' bill that would amortize the excess cost over overhead during the life of the installation.

Goodrich
Pasadena

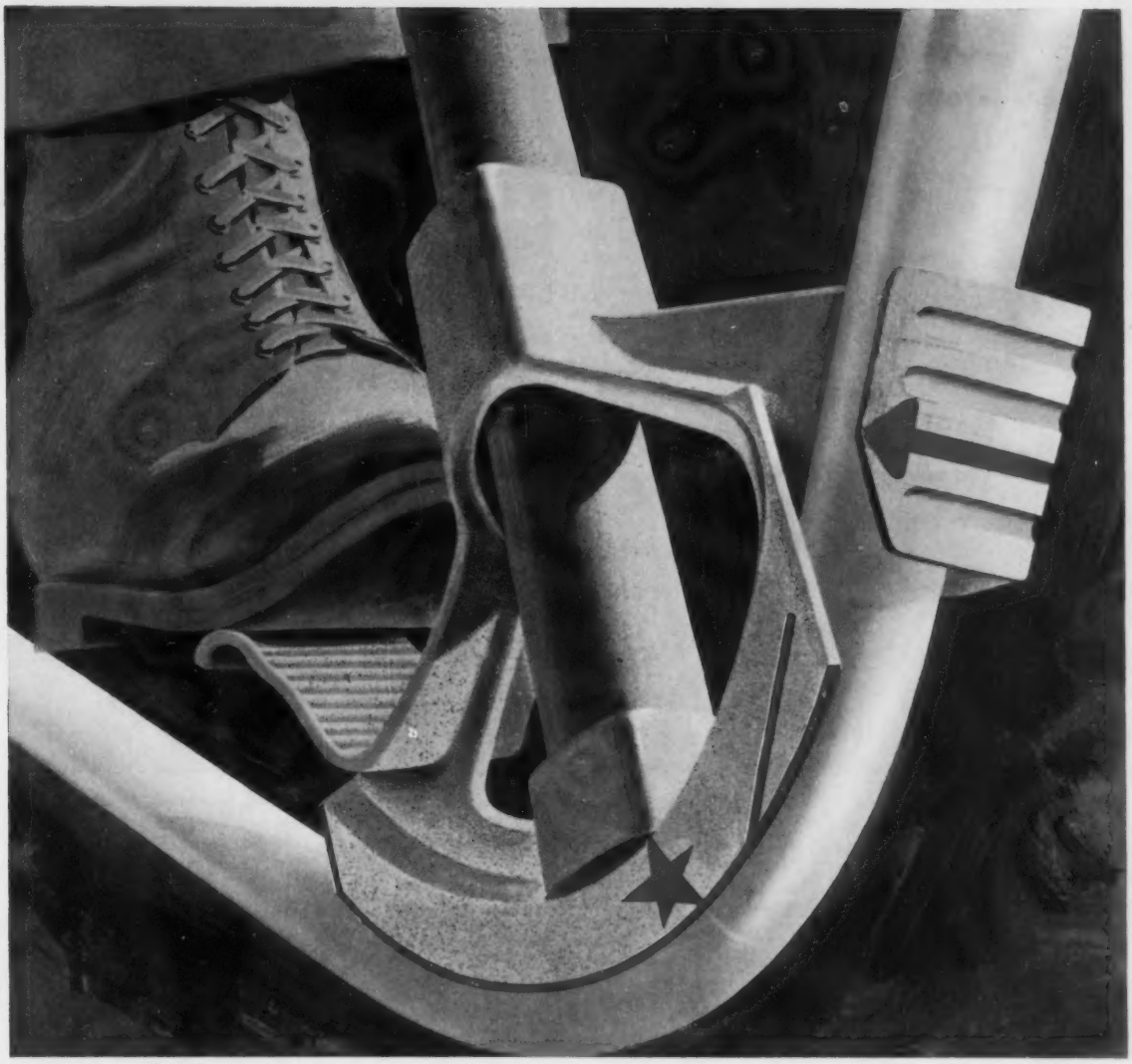
Heath
Palo Alto

Grayson
Glendale

Shaad
Sacramento

Allen
Los Angeles

Goss
Los Angeles



The NEW "REDEGE" Benfield Bender

3 tools do all hand bending jobs of both rigid Conduit and EMT

Here is a new one-piece hand tool for bending Sherarduct, other types of rigid steel conduit, and Xduct Junior electrical metallic tubing.

It's the first universal portable hand bender ever to be developed which can be used for both rigid conduit and thin wall tubing. A low cost tool, competitively priced, it eliminates the need for bench-mounted bending equipment for small size conduits.

CHECK THESE FEATURES:

One piece—with solid non-skid hook

Extended foot treadle—gives extra bending leverage

Safety reinforcing collar—removes strain from threads

Built-in back pusher

Bender is also measuring gauge—rules, tape measures often unnecessary

Five year guarantee against breakage or defects

Peek hole for left-handed use

3 TOOL SIZES

Catalog #1050—Bends ½" thin wall

Catalog #1075—Bends ¾" thin wall and ½" rigid conduit

Catalog #1100—Bends 1" thin wall and ¾" rigid conduit

Make the Test . . . Combine the Best—Sherarduct Conduit and the Redege Bender

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Branch Offices: San Francisco • Seattle • Denver
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Association Personalities

No. Calif. Chapter, Alameda County branch officers: Ed Hutka of Livermore, vice-chairman; George "Red" Curran, Oakland, chairman; Ernest Kramm, manager; and S. C. Gates, Berkeley

San Francisco Electrical Contractors Assn. re-elected for his fifth term Emil J. Weber, center, at suggestion of Earl Peak, Central Electric Co., chapter governor, right. W. J. Varley, manager, left

IAEInspectors, No. Calif. Chapter officers: Ken Bliss, secretary-treasurer; W. Creighton Schwan, Alameda County, vice-chairman; Del Hanson, Oakland, turns chair over to Pat O'Leary, Berkeley

IES Golden Anniversary honor paid to founder member, James Cravath, next to Carl Martin, left, and Bob Prussia, one of Golden Gate Section's founders, by Harold Wright, section chairman

Larry Davis addressed the East Bay Electric Club at Oakland

Seventeen of the 27 living ex-chairmen of So. Calif. Section IES

Sacramento Valley Chapter of NECA had its annual dinner dance to install new officers for the year at Sacramento in January and the head men of the chapter gathered as pictured at left for their annual picture. Kneeling, in front row, left to right, are L. C. Wesleder of Adams Electric Co., Auburn, a director; Rex Moore Jr., retiring president who becomes a director; Paul Gatejen, director. In the back row are: E. L. Bryant, Collins Electric Co. of Sacramento, new vice-president; A. J. Naylor, George Foss Co., president; E. L. French, director; Hugo Becker, Wismer & Becker, governor and a director; Lewis Stein, a past president and delegate to the Sacramento Builders Exchange. William Welsh, not shown, is manager of the chapter. He arranged the program

For Better Lighting Specify . . . HOLOPHANE

Specific units for specific applications insure maximum results. Adequate inventories of Holophane fixtures are carried by all General Electric Supply Company houses.

(A): Recessed Incandescent Unit with concave CONTROLENS* for high level, comfortable general lighting . . . **(B): Shallow surface-attached fluorescent luminaire**—in 4 foot sections and continuous runs . . . **(C): Corridor and stack unit** designed to direct balanced lighting to floor, walls and ceiling . . . **(D): PARADOME*** in ceiling and suspension types. Ideal for classrooms and offices . . . **(E): HIBAY* heavy-duty unit** for incandescent and mercury lamps. Recommended for industrial and institutional use . . . **(F): Bracket-type outdoor unit** giving widespread light distribution. For residential and industrial locations . . . **(G): POSTOP* unit** for "grounds" lighting. Exceptionally wide coverage; mounts on 3" diameter post.

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PCEA Panorama

Plans for conferences and meetings dominate the PCEA news this month.

First from the standpoint of imminence is the Engineering and Operating Conference which will be held March 22-23 at the Sheraton-Palace Hotel in San Francisco. This meeting comes so soon, in fact, that members of the PCEA's Engineering and Operating Section will be preparing to attend at just about the time they receive this issue of ELECTRICAL WEST.

Copies of the conference's proposed program have been mailed to all interested members, and a record attendance is anticipated.

PCEA members have red-circled April 18 and 19 on their calendars as other important dates to remember. On that Wednesday and Thursday, our Administrative Services Section will meet jointly with the Accounting Section of the PCGA at the Huntington-Sheraton Hotel in Pasadena. The four main topics of discussion will be: (1) financial problems; (2) legal problems; (3) right-of-way and land problems; and (4) stores problems.

Particular interest is expected in the financial problems discussion, since it will be geared to have informative value for all branches of the industry. Group Sponsor William T. Quinsler of the Arizona Public Service Co. has lined up four top-notch speakers for this program.

Smith B. Davis, assistant treasurer and financial analyst for the Southern California Edison Co., will explain how the financial statements of a corporation can be used as tools to interpret a company and its management.

Walter J. Herrman, vice-president of the Southern California Gas Co., will present an illustrated talk on why a company needs money, how it determines this need, how money is used, the types of financing and their effects on financial soundness, and long-range plans for future financing.

Dennis H. McCarthy, vice-president of the First Boston Corp., will discuss where financing money comes from—who buys bonds, who buys stock and what makes the market for securities.

Weston P. Volberg, vice-president of the Federal Reserve Bank of San Francisco, will analyze monetary control and explain the Federal Reserve system's role in stabilizing the economic system.

To assure audience participation, question-and-answer periods will follow each of the above talks.

Pats-on-the-Back-Department: Congratulations are in order for PCEA's residential adequate wiring committee, whose Revised Certification Standards have been approved by the National Adequate Wiring Bureau. Revision of these standards represents a general upgrading of the requirements, including a provision for 100-amp capacity in main service facilities. The revised standards went into effect on Jan. 1, 1956, as the basis of the Red Seal Certification Program. The highway lighting technical subcommittee has again been invited to participate in the Governor's Safety Conference and is now at work making motion pictures to dramatize special points in its presentation. This group also has received approval from the board of directors to proceed with its plan for conducting experiments in the lighting of railroad grade crossings.

Looking ahead two months, plans are proceeding for the PCEA's 39th annual convention, which is to be held in Las Vegas May 14, 15, and 16. General Chairman J. H. Pengilly has announced the following committee chairmen for the convention: assistants to general chairman—L. M. Guibara, U. S. Rubber Co., and D. D. Smalley, Southern Nevada Power Co.; program chairman—J. M. Tuttle, Motorola Corp.; stage manager—W. P. Bedgood, Southern Nevada Power Co.; comptroller—R. E. Fife, Southern California Edison Co.; attendance committee chairman—F. A. Tracy, Sierra Pacific Power Co.; banquet committee chairman—W. O. Kyte, General Electric Co.; cocktail party committee chairman—C. H. Thrane, General Electric Supply Corp.; golf committee chairman—R. E. Gates, Rome Cable Corp.; housing committee chairman—Harry Allen, Southern Nevada Power Co.; ladies entertainment committee chairman—W. T. Lucking, Arizona Public Service Co.; host committee chairman—C. A. Wikle, A. S. Schulman Electric Co.; registration committee chairman—W. L. Moats, Westinghouse Electric Corp.; transportation and general information committee chairman—Harry E. Welsh, Southern California Edison Co.; ushers committee chairman—B. F. Keyfauver, Graybar Electric Co.

ASME

Economics of power production will be a major topic at sessions of the spring meeting of the American Society of Mechanical Engineers to be held in Portland, March 18-21. Speakers include Walter Dreyer, PG and E; O. E. Walsh, Portland General Electric Co.; James N. Landis and John P. Buehler, both of the Bechtel Corp.

Quick Catch-up

EMEA

Electrical Maintenance Engineers Assn. of Southern California, with its 8th biennial Electrical Industry Show shaping up rapidly for its run, April 5-7 in Shrine Exposition Hall, Los Angeles, went under new leadership in February with the election of new officers. Carl L. Ladenberger, Southern California Edison Co., was named president to succeed Aubrey LaForce, Axelson Mfg. Co., who filled the remainder of the term when Jack Singleton moved to the north. Charles Doane, Larsen-Hogue Electric Co., was made first vice-president; Charles Hays, the Electrical Estimators (and show chairman), was made second vice-president; Daniel Slight, General Electric Co., was elected secretary-treasurer and other members of the executive committee include Robert Kernaghan, Harry Huff, Robert Marcum, Robert McCandless and Henry Schumacher. Installation meeting was on Feb. 15, at which William King, Electric Machinery Mfg. Co., spoke on "Looney Patents." At the previous meeting W. R. McIntire of Remington-Rand told how the use of more complex machines by industry will increase the responsibilities for maintenance and require a planned record system.

IES

Tentative program for the first of the three Illuminating Engineering Society regional conferences in April, that of the South Pacific Coast Region in San Francisco, April 11-13, has been released by John Walsh, program chairman. In brief it is:

Wednesday, April 11, conference opens at 2 p.m. for an "outdoor lighting" session, with welcome and dedication to the IES golden anniversary by O. R. Doerr, vice-president, PG and E. Runoff of "My Most Interesting Lighting Job" competition between chapters will follow. "Architectural and Building Floodlighting" will be discussed by William Shalda, Shalda Mfg. Co., Burbank; "Lighting for Parking Lots" by A. L. Pryor, Southern California Edison; "Lighting for Tunnels" by Harold Skeetsky and John Brass, California State Highway Department. That evening a bus inspection trip to view tunnel lighting will be made, and a street lighting dinner held at Spenger's in Berkeley, followed by inspection of the University of Califor-

VICTOR PROGRESS REPORT 2

We make our own

LIGHTNING

to give you

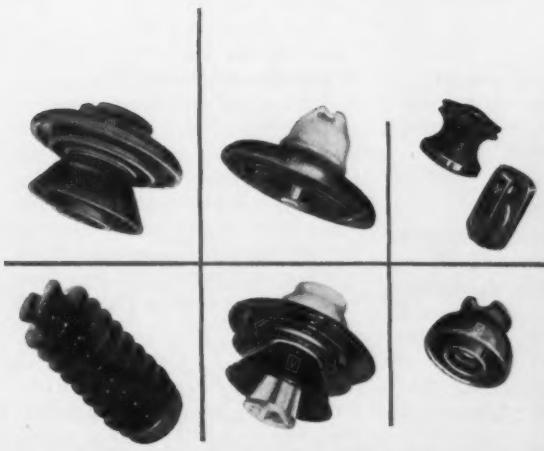
INSULATORS

that last

Shown above is VICTOR'S 800,000-volt impulse generator in our modern electrical laboratory. This unit, together with VICTOR'S complete mechanical and electrical test facilities, enables our engineers to simulate the most extreme service conditions.

Included in this unit are a remote controlled gap spacing mechanism, an oscillograph for showing wave forms visibly on the screen of a cathode ray tube and a 4″ x 5″ camera for recording these waves on film for observation and study.

One more reason why VICTOR gives you insulators that last—that are design-tested to withstand lightning and other adverse service conditions. VICTOR'S modern plant, engineering and research facilities are unsurpassed in the field. You just can't buy better insulators!



"BETTER INSULATORS THROUGH RESEARCH"

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Purified Porcelain

Insulators!

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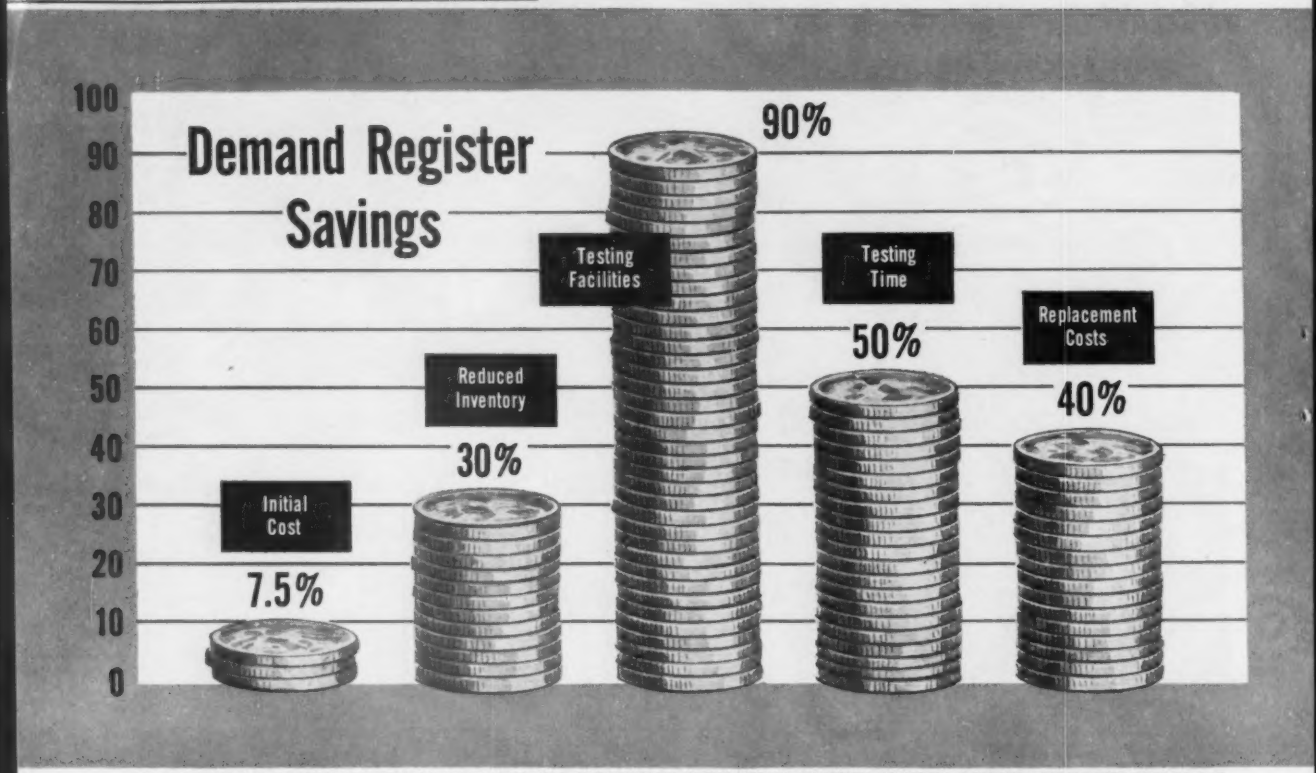
Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

DEMAND METERING



VERSATILITY AND DEPENDABILITY OF G.E.'S REGISTER OFFERS YOU SUBSTANTIAL SAVINGS IN YOUR DEMAND METERING OPERATION

Demand Registers: The Most Economical Means to Reliable Demand Metering

- Versatility of demand register offers reduced inventory costs
- On the line testing and maintenance assure lower operating costs
- Accuracy of register is unchanged during life

The many cost-saving features of General Electric's demand register offer you assurance of reduced metering costs. The flexibility of the demand register makes possible a 30% savings in reduced inventory, while the interchangeability of the register provides a 40% savings in replacement costs.

These savings plus the dependable, accurate operation of G.E.'s mechanical demand registers have led to its increasing acceptance by the utility industry. Since 1952, this acceptance has been marked by an increase of 70% annual sales of demand registers, as compared to but a 29% increase in the total demand meter market.

REGISTER FLEXIBILITY . . . The versatility of design of General Electric's demand register offers the opportunity of converting the register to different scale classes, electrical ratings, or time intervals. Standardization on one register ratio with a change in only the multiplier is but one of the many cost-saving methods which is available with only a demand register.

REDUCED INVENTORY . . . The opportunities for reduced inventory are substantial with the use of demand registers. Any stock single-phase or polyphase watthour meter can be converted to a demand meter merely by substituting a demand register. This adaptability which results in reduced inventory and operating costs is unique with demand registers.

IN SERVICE . . . A watthour meter can be readily converted to a demand meter simply by the interchanging of registers. Also, quick,

easy, accurate and low-cost field testing can be realized with demand registers. With the use of a G-E self-checking adapter, the need for elaborate testing equipment is eliminated and costly hours of labor are greatly reduced.

REDUCED TESTING . . . General Electric engineers have released test results which give assurance of increased reliability of demand registers. These tests show that the life of the register rotor has been extended up to 10 years. This fact means that the register will need testing and maintenance only during periodic meter tests.

DIRECT GEAR DRIVE . . . Not only is the register on the same testing basis as the meter but also the demand register possesses the same stability of calibration as the meter. This high accuracy remains unchanged during life, and thus assures reliable operation for years. In comparison with other types of demand metering devices, the register is relatively unaffected by such variables as friction and climate.

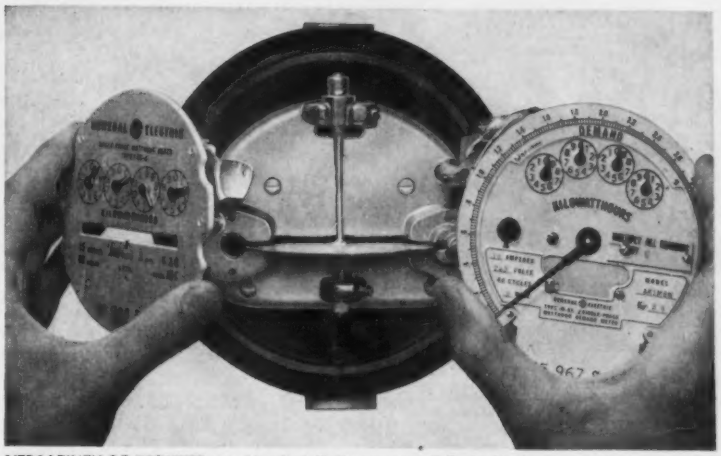
These facts offer you the greatest possible assurance that General Electric's demand registers are your most reliable means to low-cost demand metering.

MANY UTILITIES . . . Increasing numbers of utilities are taking advantage of the benefits offered by demand registers. Here are but a few: Commonwealth Edison Company, Wisconsin Electric Power Company, Kansas Power and Light Company, Duke Power Company, Pacific Gas and Electric Company, Southern California Edison Company, Public Service Company of Oklahoma, and New Orleans Public Service Inc.

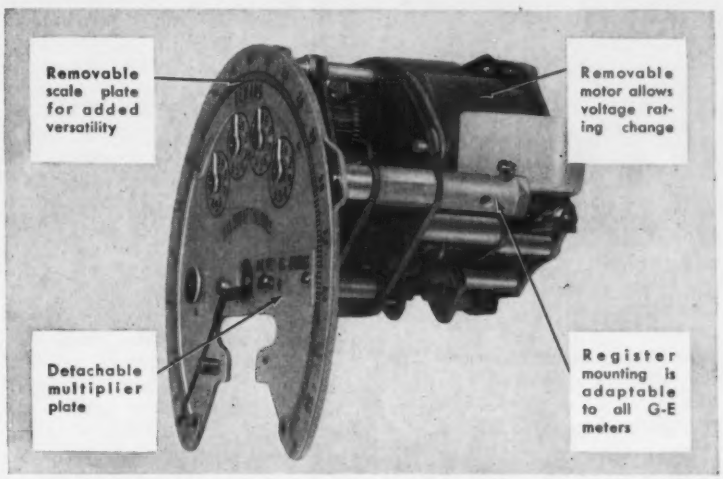
FOR MORE INFORMATION . . . If you would like more information on General Electric's mechanical demand registers, write to Section 621–13, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

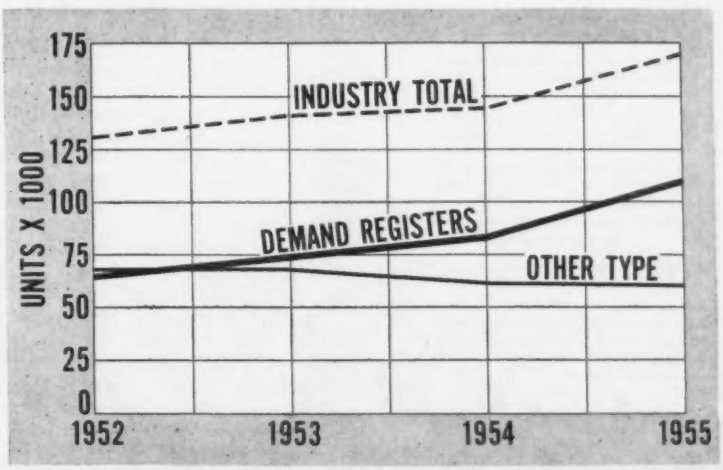
GENERAL ELECTRIC



VERSATILITY OF REGISTER provides installation on any G-E single-phase or polyphase meter.


Removable scale plate for added versatility
Removable motor allows voltage rating change
Detachable multiplier plate
Register mounting is adaptable to all G-E meters

FLEXIBILITY OF DESIGN allows change in scale classes, electrical ratings, and time intervals.



INCREASING USE of demand registers has resulted from the dependable low-cost operation.

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

sell the
AUDIBLE
SIGNALS
that are
EASIER to INSTALL

Faraday Uni-Pact
1. Wire to safe, dead-front adapter plate from any 4" outlet box, Wiremould or Conduit.
2. Screw adapter plate to fitting.
3. Plug Uni-Pact signal into adapter plate—easy as plugging in any appliance.

... and give amazing
Flexibility, too!

12 different sound instruments all fit one adapter plate

Handle signal systems? Here's why it will pay you to feature Faraday Uni-Pact:

Easier to install—you make more profit on each installation.
Easier to sell—gives your customers amazing flexibility (horns, buzzers, bells, chimes all plug into one adapter plate).
Virtually damage-proof—sound instruments go on after rough-in men are finished.
Safer to install—no exposed terminals in dead-front adapter plate.

Note: *Smart contractors rely on Sperti Faraday engineering for the best in:*
Annunciators • Synchroneus Clocks • Door Openers • Fire Alarms • Transformers • Electric Clock Systems • Contact Devices • Freezer Alarms • Sirens • Plugmaster Cord Sets.

Sperti Faraday Inc.
Engineers in Sound and Sight Since 1875
ADRIAN, MICHIGAN

nia lighting laboratory and fluorescent lighting on the San Rafael-Richmond bridge.

Thursday morning will be devoted to residential lighting, with Walter Doty, associate editor of *Sunset Magazine,* in charge. He will have architects, builders and landscape architects cover interior and garden lighting from these outside viewpoints. The afternoon session on industrial lighting will hear: "Light and Vision on the Production Line" by C. L. Crouch, IES technical secretary, New York; "Light Sources for Industry" by R. L. Slauer, Sylvania Electric Products, Salem; "Lighting the North American Aviation Plant" by J. S. Hamel, consulting engineer, Burbank; and "125 F-c Luminous Ceilnig for Industry" by Thomas Allinson, Beckman Instruments Co., Berkeley. That night there will be a reception for President and Mrs. R. F. Hartenstein of IES. He is director of commercial sales for Ohio Edison Co., Akron.

Friday morning will be store lighting session, with L. M. Cutler, General Electric Lamp Division, Cleveland, speaking on "Seeing Is the Biggest Thing in Selling." O. W. Willard of Macy's, San Francisco, will tell of Macy's elimination of show window reflections. There will be talks also by a store design architect. The conference will conclude with the noon luncheon address and report of President Hartenstein and the presentation of the awards for the "My Most Interesting Lighting Job" contest.

Programs for the Pacific Northwest conference in Spokane, April 19-21, and the Intermountain Region in Salt Lake City, April 26-28, have not yet been confirmed for announcement.

British Columbia Section made a special banquet of the anniversary dinner Jan. 10 in Vancouver, B. C. J. H. Gilbreath, section chairman, presided. Blair E. Plowman, regional vice-president from Spokane, presented a birthday message. Other speakers were R. G. Scott who reviewed the progress of the society, W. J. Lind, the history of light sources, E. E. Ackland, evolution of lighting fixtures, Kenneth Reid, street-lighting progress, and A. E. Simpson forecast the future. Vancouver Island Chapter members joined in the program. Kenneth Reid discussed 90 years of street lighting in B. C.

Southern California Section was addressed by John Walsh, representing the council of IES at its 50th anniversary celebration dinner Jan. 4. The occasion was further enhanced by a table of honor occupied by two members emeritus and 17 of the 27 living past chairmen. Roy Kreyser, chairman, presided.

Golden Gate Section celebrated the anniversary Jan. 19 in San Francisco. Harold Wright, consulting engineer, section chairman, presided. One of the society's founders, James Cravath, now a member emeritus, and one of the founders of the section, Robert Prussia, were asked to tell of the beginnings of the society. Romaine Myers, another of the section's founders, was unable to come because of his wife's death.

NECA

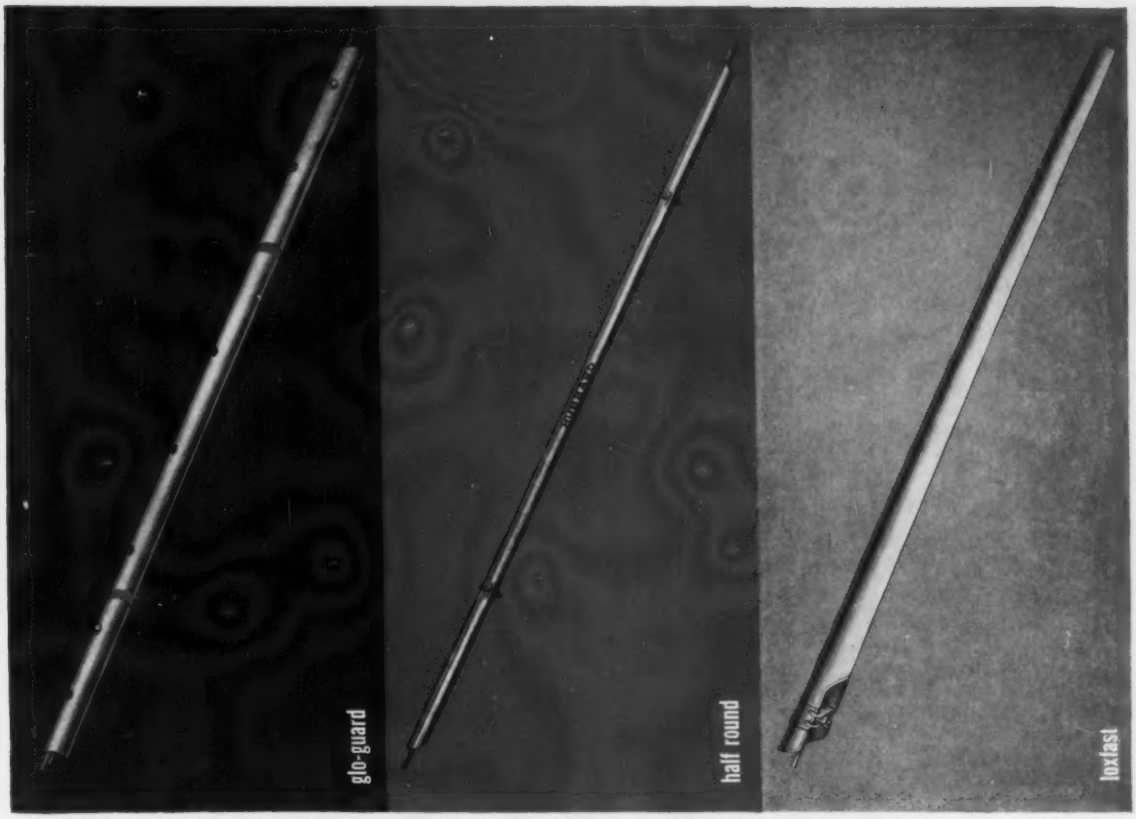
Northwest Line Constructors Chapter of National Electrical Contractors Assn. recently elected officers for 1956. E. B. Sargent is president, George B. Schetky is governor and S. E. Lawrence treasurer. Board members in addition to the officers are R. A. Montgomery, John M. King, Matt O. Wilson, Roy Sargent.

Also announced by Chapter Manager Laurence C. Rodgers were committee appointments. Don L. Cooney is chairman of the Bonneville joint advisory committee, S. E. Davidson of business development, President Sargent of the labor-management committee, A. R. Beard of the Washington and J. R. Davidson of the Oregon safety committees and Homer Bergen of training and education. The chapter has operated the most outstanding linemen apprentice training program in the nation.

Oregon-Columbia Chapter of NECA, also with Portland as headquarters, elected J. A. McCoy as president, S. I. Jaggar as governor, S. S. Adams as vice-president and A. R. Johnson treasurer. Other board members are L. C. Adams, Glen Emory, Fritz Friberg, W. M. Graham, G. H. Sutherland, Riley R. Taylor and W. R. Grasle, past president, as an ex-officio member. Grasle is vice-president of District 6.

Directors from the four divisions of the chapter are: C. A. Vibbert, Cascade division; William T. Moura, Central Oregon division; L. H. Morris, Eugene-Springfield division and Frank V. L'Amie of Longview-Kelso division. General membership meetings of the chapter are held the second Monday of each month.

Committee chairmen for the chapter are: J. L. Krauser, adequate wiring and modernization; S. S. Adams, apprenticeship; G. H. Sutherland, jobbers, with each division director on his committee; S. I. Jaggar, business development and bid depository: A. R. Johnson, city hall; Ogden Moulton, education and program development; S. I. Jaggar, labor relations; W. M. Graham, membership; S. I. Jaggar, program and entertainment; and S. S. Adams, legislative. Laurence Rodgers also manages the Oregon-Columbia Chapter.



on guard!

Hubbard Guy Protectors are designed to meet the requirements of maximum safety, visibility and shock resistance. Like all Hubbard Hardware, they install quickly, give years of service and have low replacement costs.

The next time you order Pole Line Hardware, check your Hubbard Catalog Number 60. More than 300 Hubbard distributors throughout the United States are ready to serve you.

GLO-GUARD—Two bright red reflective strips give maximum visibility day or night. Glo-Guards are formed from 18 gauge Cor-Ten steel that has a much greater resistance to corrosion and withstands impact to a greater degree than carbon steel.

HALF ROUND—Gives top protection under the most rugged service conditions. Extra rigidity is assured by the turned-in edges. U-Bolt clamping is designed to fit either strand, rod or clamp.

LOXFAST—Installs by tightening one bolt on the bottom clamp. The top clamp is fitted to the guy wire by a clip arrangement. Heavy gauge, double-dipped galvanized steel makes for extra strength, high visibility.

QUALITY! FOR MORE THAN A CENTURY

Secondary Racks • Wireholders • Pole Seats and Balconies • Braces • Drive Hooks • Wood Strain Insulators • Clevises • Extension Arms • Long Span Hardware • Pins • Clamps • Guards • Stubbing Bands • Guy Protectors • Guy Clamps • Pole Struts • Clips • Straps • Hangers • Carriage Bolts • Lighting Standards • Lighting Brackets • Eye Bolts • Pole, Corner and House Brackets • Guy Hooks • Strain Plates • Lags • Machine and Hubeye Bolts • Sidewalk Guys • Autogap Lightning Arresters

HUBBARD AND COMPANY

Pittsburgh 1, Pa.
Chicago 50, Ill.
Oakland 8, Calif.

George L. Standring Memorial Hospital Electrical contractor—American Electric Company

Build

The electrical requirements of a modern hospital depend upon a quality wiring job for unfailing efficiency.

Metal raceways of Rome-EMT and conduit provide orderly arrangement of circuits as well as permanent protection.

reputation with quality

like this Seattle contractor did

New hospitals, manufacturing plants, public buildings, shopping centers are *news*. They bring business-building local publicity to participating contractors via the papers, radio, TV, public inspection and word-of-mouth.

"Free advertising" for American Electric

Around Seattle, for instance, door-opening day at the George L. Standring Memorial Hospital occasioned much fanfare and public interest. Firms like Clem Morisette's American Electric Company reaped a wealth of free publicity—justly so, because they did a good job.

One source—one responsibility

Mr. Morisette had the contract for the installation of all wire and conduit. Through his electrical distributor, he specified his requirements from one source, Rome Cable. Rome's Seattle office worked hand in glove to make his job easier . . . a typical feature of Rome's personalized service.

Now, power for operating rooms, theraupeutic equipment, and lighting flows—safe from interruption — through some 350,000 feet of Rome Synthinol®

Quick availability of requirements, plus teamwork of Rome's representative, helped Clem Morisette (left) complete his electrical contract efficiently.

Type TW thermoplastic wires and cables protected within Rome-EMT thinwall conduit.

Rome-EMT cuts installation costs

The slick inside finish (Rome-EMT is easier to fish than any competitive thinwall conduit on the market) cuts fishing time, saves valuable man hours. Designed for one-man handling, with threadless compression joints, Rome-EMT was easy to work and install, too.

Rome Synthinol Type TW speeds wiring

The waxy-smooth thermoplastic surface and small diameters of Rome Synthinol Type TW help save time, make it clean to handle . . . easy to strip . . . easier to pull. Fully approved by Underwriters' Laboratories, Inc., Rome Synthinol building wires resist moisture, heat (even flame), oils and chemicals.

Many electrical contractors get the *same* advantages of Rome one-source responsibility and product quality which helped Mr. Morisette do a reputation-building job in Seattle. Rome Cable's sales representatives across the country stand ready to help you. Our engineers will be glad to study your wiring problems.

Write direct for information, or contact your nearest Rome Cable representative.

For helpful data on Rome Synthinol and Rome Synthinol 901 Type TW building wires and cables, write for Bulletin TW-1. Free. No obligation.

Rome sales offices are located in:

Atlanta, Ga.	New Orleans, La.
Boston, Mass.	New York, N. Y.
Chicago, Ill.	Philadelphia, Pa.
Cleveland, Ohio	Pittsburgh, Pa.
Dallas, Texas	St. Louis, Mo.
Denver, Colo.	St. Paul, Minn.
Detroit, Mich.	Salt Lake City, Utah
Houston, Texas	San Francisco, Calif.
Kansas City, Mo.	Seattle, Wash.
Los Angeles, Calif.	Tulsa, Okla.

It costs less to buy the best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

THIS MONTH'S NEWS

Southern California Edison Applies for New Rate Classification for Underground Service

The Southern California Edison Co. has made application to the California Public Utilities Commission for a new class of service where the company is required to furnish service from underground distribution systems installed at its expense but not required for its operating convenience. This action, states the company in its application, results from requests by certain customers that service be rendered by the utility through underground facilities without full appreciation of such applicants of the cost involved of providing such facilities. The company, however, stated that it was ready, willing and able to provide such new type of service in the future to any group of customers that desire to pay the fair, just and reasonable rates required to provide such service. The company further stated "any attempt by the utility to provide such service without charging fair, just and reasonable rates required thereby to certain customers would, it is believed, result in the establishment of unreasonable differences as to rates, charges, service and facilities, and would constitute an undesirable and prohibited preferential treatment."

The company contends that the establishment of a rate commensurate with the cost of providing such service would enable it to provide customers desiring underground service with such facilities and would at the same time fully advise persons unaware of the economic cost involved of the additional charges necessary to meet their particular desires.

The proposed rate schedule provides for rate surcharges for service from underground distribution systems for all classes of customers and would cover the entire territory served by the utility, within designated underground distribution areas as fully described in the description of rates. The new rate schedule, as shown in the attached table, provides surcharges for both the service and energy used, the indicated surcharges to be added to the charges (including minimum charge) described by the applicable overhead schedules.

In designing the rate, the company used that portion of the rate base subject to change in the event underground distribution facilities were substituted for overhead distribution facilities. This was determined to be $150,956,000 or about 23% of the total system rate base for the average year 1954. This amount was then allocated to customer groups whose rate schedule should be adjusted in the event of such substitution of underground facilities. After determining the amount of such rate base for each of the customer groups, the amount was segregated into cost components and an annual cost determined by applying the estimated total annual fixed charges for ad valorem taxes, depreciation, income taxes, and return to the allocated capital amounts. The annual cost for underground service facilities were determined to be six times the annual costs for the equivalent overhead facilities, the system ratio used being 7 to 1.

Although no action has yet been taken by the commission, the application represents a move toward clarifying the controversial area of overhead vs underground distribution facilities with particular reference to cost responsibilities therefor.

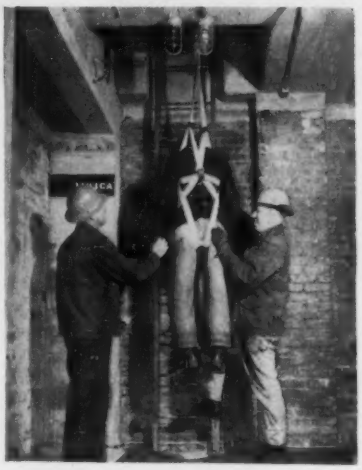
The rate schedule applicable for service from overhead facilities will be adjusted as follows:

Service	Applicable Overhead Service Schedule	Surcharges Per Month: Per Customer	Per Kwh	Per Hp or Kw
Domestic	D-1,2,3,4,5,6	$4.25	0.5c	
General	A-1,2,3,4,5,6	$8.00	1.0c	
All other				
Connected load basis	P-1, H, LS-2	$8.00	0.5c	$1.20 per hp or kw connected
Demand basis	A-7, P-2	$8.00	0.5c	$1.20 per kw of billing demand

Special Conditions:

(a) The surcharge above specified shall be added to the charges, including minimum charge, prescribed by the applicable overhead service schedules.

(b) The company will not provide service under this schedule in conjunction with any schedules other than those shown above.



A PARACHUTE HARNESS is used by Tacoma City Light crews in a new procedure developed to rescue stricken workmen from downtown underground vaults after giving first aid treatment

Priest Rapids Power Sale Talks Underway

Negotiations for purchase of power from the proposed Priest Rapids project of Grant County (Wash.) PUD are underway.

Grant County PUD holds an FPC license for construction, with a stipulation that construction must be started before July 1. Since the PUD is not using power from the project itself, it must make arangements to sell it before financing can be secured.

Bargaining sessions in Seattle lasted several days but results were not reported. Participating were Seattle City Light, Tacoma City Light, Eugene Water & Electric Board, Puget Sound Power & Light Co., Washington Water Power Co., Pacific Power & Light Co. and Portland General Electric Co.

PUD Manager Glen Smothers said that an idea seemed to prevail that some other public agency might take over this project if the PUD is unable to finance it, but declares that this would cause it to revert to federal control.

Contractor Paul G. Ellis has filed for an injunction to stop construction of the project. He says the PUD is acting for outside interests.

Miniaturization takes a big step forward as Driver-Harris announces...

.0005 ENAMELED KARMA* WIRE

rated 3200 Ω/ft.

What this development can mean to resistor manufacturers is here dramatically illustrated. The large wire-wound resistor is rated at 1 megohm. The infinitely smaller one, wound with .0005 Enameled Driver-Harris Karma is rated at *1½ megohms.* In this particular application 50% more resistance or ½ megohm has been put on a ceramic spindle 1/5 the size of the original bobbin.

Even though we have succeeded in drawing Karma down to this fine size, its outstanding electrical and physical properties are maintained. Most important of these are:

- Low Temp. Coeff. of Resistance less than ± 20 parts per million
- Wider temperature range—65°C to 125°C
- Low thermal EMF against copper (equalled only by Manganin)
- High tensile strength combined with lower thermal expansion
- High resistance to oxidation

Add to these advantages the fact that the final cost per ohm is lower than in heavier sizes. Available now in commercial quantities. Complete data mailed on request.

*T.M. Reg. U. S. Pat. Off.

SPECIAL PURPOSE ALLOYS SINCE 1890 — D/H — TRADE MARK REG. U. S. PAT. OFF.

Driver-Harris COMPANY HARRISON, NEW JERSEY

Western Representative: ANGUS-CAMPBELL, INC. • 4417 S. Soto St., Los Angeles • 917 Bryant St., San Francisco 3

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

OPTIMUM INVESTMENT*
Power Transformers

*Optimum Investment

General Electric's assurance of lower long-term cost, plus greater dividends from your power transformer investment, through:

- **LOW ENGINEERING COST:** G-E field services reduce your engineering expense.
- **LOW PURCHASE COST:** Skill to produce optimum design for each application.
- **LOW INSTALLATION COST:** Upright shipment, one-piece tank speeds handling.
- **LOW OPERATING COST:** Constant characteristics for lasting economy.
- **LOW MAINTENANCE COST:** Product improvements and few failures reduce outages.

VAPOR-PHASE DRYING drives moisture from core-and-coil assembly before tanking. Hot oil vapor in high vacuum dries organic parts, preventing later oil contamination in service. Tightness maintains short-circuit strength.

LOCKING METHODS are special—only four are used. None depend on a cutting or shaving action that chips off metallic shavings. Insulation strength is not impaired by razor-sharp particles. Locking strip, shown above, is one method used.

How much are you paying for aging power transformer characteristics?

General Electric uses the special care necessary to help prevent losses and other characteristics from changing

Power transformers could age. Lightning and surge voltages, system fault currents, years of operating at varying temperatures, pick at the insides of a transformer. Parts could shrink. Braces and clamps could loosen. Then turn-to-turn, layer-to-layer, even lamination shifting (the latter causing interlaminar insulation wearing) could occur. Not readily apparent, this deterioration could reduce impulse and short-circuit strengths, increase core loss, exciting current, noise. Once started, the degeneration tends to be cumulative.

The result of deterioration is higher costs from increased losses and lowered failure resistance. Hence, care must be taken, extra care, to resist costly deterioration. General Electric power transformers have been redesigned, are built with special care to help keep characteristics at their original optimum values. Four examples of this care are: vapor phase drying, the patented process for removing moisture; the stress-resistant braces and clamps; the highly-compressed spacers; and the meticulous attention to locking of studs and bolts.

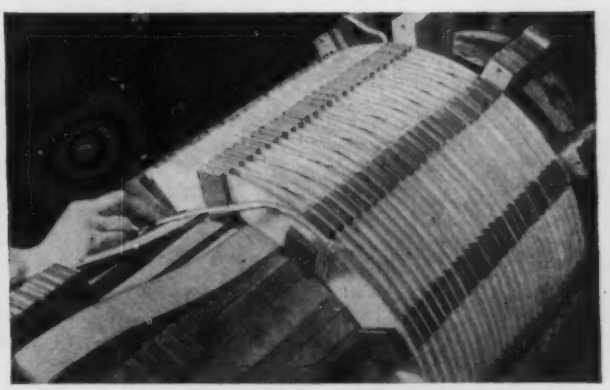
These are examples of features designed to give you economical operation. There are more. And, combined with other features that give low purchase, installation, maintenance, and engineering costs, they make your General Electric Power Transformer an *Optimum Investment.* General Electric, Schenectady 5, N.Y.

421-43

Progress Is Our Most Important Product

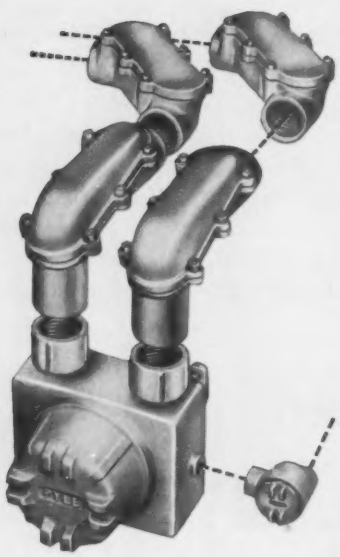
GENERAL ELECTRIC

ASSEMBLY BRACING gives positive pressure for spring-like rigidity. Stress-free clamping holds down core loss, retards abrasive rubbing of laminations. Full strength and low losses are maintained by clamping system.



KEYED WINDING SPACERS, of extra-dense pressboard, are pre-compressed at 24,000 p.s.i. After vapor-phase process removes moisture, adjustable clamps re-compress coil stacks. Spacers don't shrink, loosen, or slip out in service. Coils remain rigid and strong.

PYLE-NATIONAL
JUNCTION
PYLETS®
for
hazardous
locations



EXPLOSION-PROOF / DUST-TIGHT

- Types for all purposes
- Accessible cover openings
- Ample wiring space
- Convenient wire pulling
- Rugged construction
- Taper tapped hubs
- Integral conduit bushings
- Flat or dome covers
- Cadmium plate

Types for non-hazardous locations also available

Sold Nationally Through Authorized Distributors

THE PYLE-NATIONAL COMPANY
WHERE QUALITY IS TRADITIONAL
1364 N. Kostner Ave., Chicago 5, Ill.

Friant Water Storage Is Ruled to be Illegal

U. S. Judge Peirson Hall, in Los Angeles, has ruled that the federal government is illegally impounding water with Friant Dam on the San Joaquin River.

The ruling states that the water belongs to owners of some 300,000 acres of land below the dam. He said the federal government has no sovereign title to water in the San Joaquin watershed, and that recognition of such a claim "would, in effect, deprive property owners of their water rights on every stream on which there is a federal dam."

The government, the judge ruled, can acquire title to water only by outright purchase, contract or legal condemnation, and that unless these rights are sold by the property owners, they belong to the land and cannot be lost by either use or disuse. He stated the government itself has shown recognition of this in previous purchases and contracts involving water rights.

The decision climaxes nine years of litigation over the water rights. The case was brought by a group of landowners in a stretch of land between Friant Dam and Mendota pool. Some of the water from the San Joaquin River is stored at Friant Dam for irrigating areas north and south of Fresno through the Madera and Friant Kern canals. A portion of the stored water is replaced lower on the San Joaquin with surplus water from the Sacramento River canalled into the Mendota pool.

Bureau of Reclamation officials responsible for operation of the Central Valley project had no comment to make on the decision.

State Engineer Harvey O. Banks said: "The decision on its face raises some serious questions which certainly have to be resolved. We are anxious to study the entire decision not only as to its possible effect on the CVP but also on state water development plans."

Judge Hall announced he will retain jurisdiction, and may appoint a "water master" to supervise distribution of the impounded water until the legal questions and extent of water rights of the plaintiffs have been resolved.

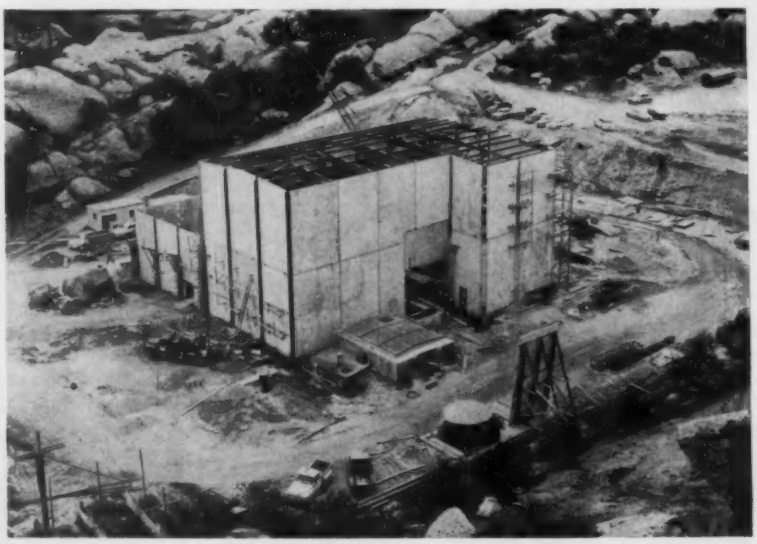
Bid Calls Announced For PGE's Pelton Job

Portland General Electric Co. has made a call for bids on major parts of its Pelton hydroelectric project.

Plans are for work to be underway March 20 and to be completed in two years.

Located on the Deschutes River in central Oregon, the project includes a concrete arch-type dam, power house, spillway and reregulating structure.

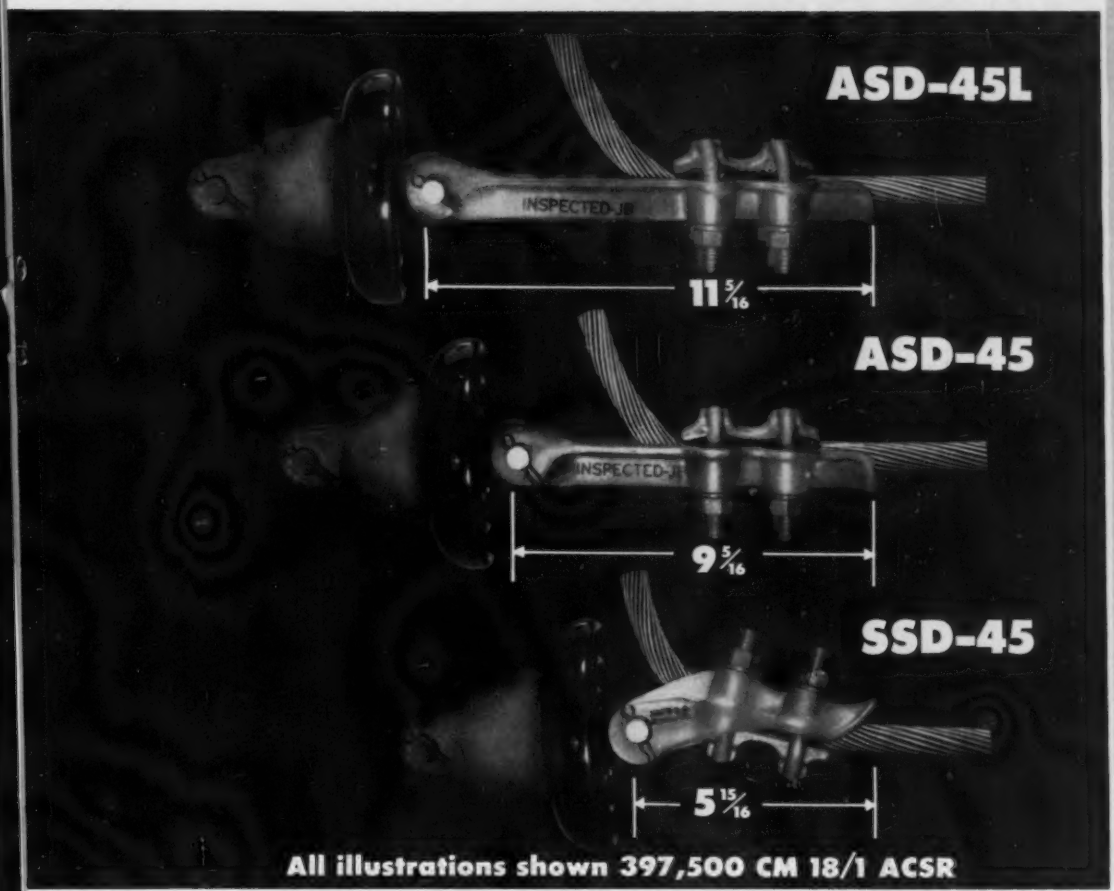
Still subject to change are plans for fish ladder and fishway facilities. They are still in the design stage and are being discussed with the Oregon Fish Commission.



Pictured is the construction of the first nonmilitary atomic energy reactor that is destined to produce power for the generation of electricity. Atomic International, a division of North American Aviation Inc., is building the reactor on Santa Susana Mt., near Los Angeles. Southern California Edison Co. will build heat exchanging equipment and a generator to utilize heat from the reactor. Edison will spend about $1,000,000 on it

Tailored for the job by *Bethea*

advanced design



All illustrations shown 397,500 CM 18/1 ACSR

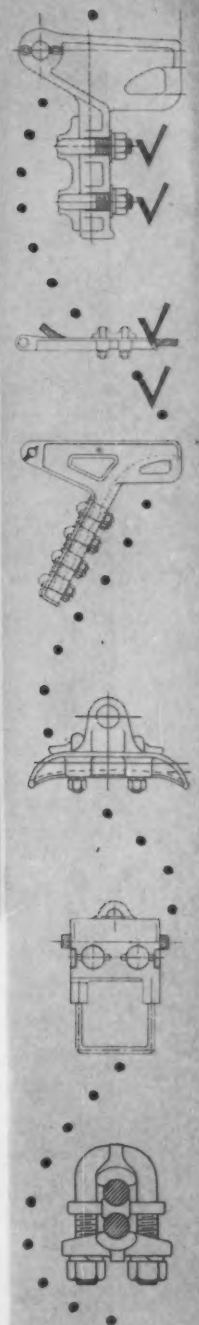
Shown above is a typical example of the manner in which Bethea Company offers variations upon a basic design in order to more closely coordinate with differing construction policies. The clamping sections and physical properties of all three clamps illustrated are identical. These and all other Bethea clamps incorporate high strength, cold rolled steel U-bolts, silicon bronze humped cotter pins, along with the industry's most consistently high quality heat treated aluminum alloy castings.

"CAUTION" Because of the confusing and sometimes conflicting claims made by various manufacturers of straight dead-end clamps we strongly recommend that prospective users of such clamps require certified test data covering *production* clamps. As an alternate, we recommend that the user perform his *own* tests on *production* clamps so that performance and quality as well as cost can be determined.

For example, a competitive series claimed to have the highest holding power of any comparable series available compares with Bethea clamps as follows:

Cable Size	Bethea Cat. No.	Bethea* Slip Strength	Published Values Competitive Clamps
1/0-6/1 ACSR	ASD-34	3980 lbs.	3850 lbs.
2/0-6/1 ACSR	ASD-34	4825 lbs.	4150 lbs.
4/0-6/1 ACSR	ASD-34	5600 lbs.	5975 lbs.
336.4-26/7 ACSR	ASD-5	7900 lbs.	6950 lbs.

*Tests by Pittsburgh Testing Laboratories



Bethea COMPANY, INCORPORATED
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West Coast Representative:
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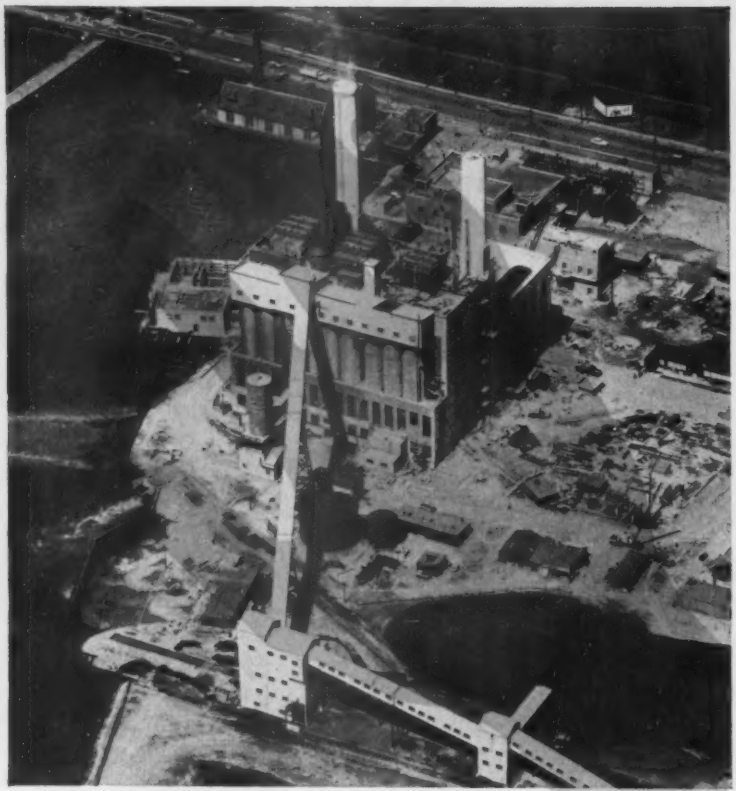

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See Catalogues in Sweet's Industrial and Engineering Files

*Trade Mark

Seattle Makes Plans To Buy From Box Canyon

Seattle city council has approved four ordinances designed to help assure a 50-year supply of power from the Box Canyon hydroelectric plant of Pend Oreille PUD.

The ordinances include a purchase contract with the PUD, a sales contract with Alcoa and two contracts with Bonneville Power Administration.

The agreement with the PUD gives Seattle a minimum of 48,000 kw of prime power from Box Canyon for the first 12 years. The amount will be reduced to 36,000 kw after 1967, and gradually down to 12,000 kw by the end of 45 years. If the PUD should get additional power sources, however, Seattle will continue to get a minimum of 48,000 kw.

A 12-year sales contract with Alcoa provides for sale of 30,000 kw during off-peak hours to the company's Wenatchee and Vancouver plants.

One agreement with Bonneville is a 20-year wheeling contract to get power to the aluminum plants. It has two 15-year renewal periods. The other provides for minor modification of the present BPA purchase contract to allow City Light to sell energy to Alcoa, which is far outside the Seattle service area.

City Light will pay the PUD about $20.75 per kilowatt-year through July 31, 1963, and $23.75 thereafter, with Bonneville to receive $4.18 per kilowatt-year wheeling charges. Alcoa will pay 2.70 mills per kwh through July 31, 1959, and 2.85 mills thereafter. All these prices are subject to adjustment as Box Canyon operation costs vary.

Utah Court Rules REAs Not Public Utilities

Utah Supreme Court members unanimously ruled that REAs are not public utilities and therefore have no standing before regulatory bodies.

The decision permits Utah Power & Light Co. to extend lines into San Juan County. Actually, the lines are already built, but opposition to the extension of service developed from several REAs in the area.

The high court ruling backs up an earlier decision by the Public Service Commission.

• **Wyoming Public Service Commission** has authorized Lincoln Service Corp., Frontier, Wyo., to issue more than $1,000,000 in bonds to finance extension of transmission and distribution lines in the upper Green River basin.

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Here is the Special Inspiration-Lighting® Sale

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REGULAR $26.95*.....SALE PRICE $23.95*

M-839 Same as M-840 except with chain hanger instead of reel. 16" diameter.
REGULAR $21.95* SALE PRICE $19.75*

Center... M-1097 Popular pull-down "Bubble" light. Adjusts up or down from 21" to 49" at fingertip touch. Soft white vinylite accented with Polished Brass. 18" diameter.
REGULAR $26.95*.....SALE PRICE $23.95*

Right... M-1058 Over buffet or dining table contemporary fixture. Frost-white fiberglas with louvered lens. Pull-down type, adjusts up and down from 20" to 52". Trim, Brushed Brass. 21" diameter.
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Special sale offer expires May 15, 1956.
*Prices slightly higher Denver and West

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Writer Burton (dark glasses) and Photographer Coffey wait as patrolmen discuss routes

Colorado Patrolmen In Magazine Article

Wintertime patroling of Public Service Co. of Colorado's transmission system will be reported in the *Saturday Evening Post,* probably in March.

The magazine's team included Hal Burton, former ski and mountain troop instructor, and Pat Coffey, nationally known Denver photographer. The two men walked over Hagerman Pass on the patrol beats of Coy Ford, Sam Jones and Sylvester Lell. Then they made their way over Argentine Pass, the highest point of any transmission line in the nation, at 13,700 ft, with Patrolman Hank Emore.

Eldin "Ole" Larsen, transmission department general foreman, and Bob Janke, publicity department, accompanied the team wherever possible.

Writer-mountaineer Burton commented that he found the patrolmen "a group of very fine and very devoted men."

New Partisan Group Organized in Oregon

More partisan fireworks is foreseen in Oregon, where an Oregon Utility Consumers Assn. has been formed.

The group was initiated by a group of Portlanders to learn "what we, the general public, must do to secure fair and equitable treatment before the Public Utilities Commission.

"For years dissatisfaction with the control and regulation of the public utilities in Oregon has been steadily mounting. As the impact of rate increases upon rate increases for utility services has hit the public, sharp protests have been made to the public utility commissioner by small and isolated groups of citizens. In almost every case their protests have received courteous attention—and nothing else. And curtailment of service falls into the same pattern."

Tacoma City Utilities Protest Highway Costs

Tacoma City Light and other municipal utilities are protesting against paying for relocation of their facilities in connection with state and federal highway projects.

City Light is being required to pay $80,000 for rearranging facilities because of an underpass project on a state highway passing through the city.

Paul J. Raver, City Light superintendent, said the $80,000 would be a drop in the bucket if the utility system had to be changed because of a multi-million dollar toll road that may be under construction this year.

The Board of Public Works has asked the city council for a resolution officially demanding relief from state and federal authorities.

Fraser Fish Problems Tackled by University

University of British Columbia has launched two major surveys of Fraser River hydro-fisheries problems.

Major purpose of the surveys are to determine how British Columbia Power Corp. and Moran Development Co. can build a total of 11 dams on the river without ruining a $50,000,000-a-year salmon industry.

The university has a $50,000 grant from B. C. Power Corp. for the surveys.

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Utility and PUD Agree On Wells Development

Puget Sound Power & Light Co. and the Douglas County PUD have ended a two-year controversy over which shall develop the Wells site on the Columbia River.

The agreement lets the PUD build the project without opposition from Puget in exchange for an option to buy 50% of the power at cost after the needs of the PUD and Kaiser Aluminum & Chemical Corp. are met.

Corps of Engineers estimates are that the site has a 600,000-kw potential.

Both Puget and the PUD filed for FPC preliminary permits two years ago, with the PUD winning out. Puget protested and new hearings were scheduled to be held Feb. 6. The new agreement eliminated the need for more hearings on which was entitled to build it.

This is the second agreement Puget has reached with a PUD this year. First was with Chelan PUD when Puget sold its share of Rock Island Dam to the PUD and joined forces in building the Rocky Beach project.

Bureau and Utility Men Discuss Trinity Plans

Bureau of Reclamation and Pacific Gas and Electric Co. officials held a meeting recently at Sacramento to discuss possible partnership development of the proposed Trinity River project.

Attending was Wilbur A. Dexheimer, reclamation commissioner, who said: "This is the first time we have been in a position to get down to brass tacks on estimates of costs, tunnel sizes and other details."

The partnership plan under discussion was blasted a few days later by Adlai Stevenson at a Sacramento press conference.

Government and PG and E engineers will hold a series of meetings to prepare neceessary information for a report on the proposal which is due to be made to Congress in February 1957.

PG and E has offered to build the power generating facilities of the Trinity project, and to pay the government for falling water. Ownership of the facilities will be in the hands of the government.

• **Eugene, Ore., voters** will decide March 27 by special election whether to authorize $8,500,000 revenue bonds for construction of the Beaver Marsh hydroelectric project and necessary transmission facilities.

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167 KVA
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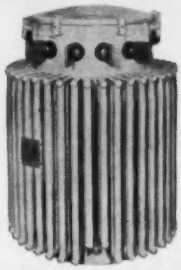

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Bids and Contracts

• **Halsey, Stuart** & Co. Inc. of New York submitted the lowest of eight bids received by the city of Tacoma for a $5,000,000 City Light revenue bond issue. It offered to take the issue at an interest rate of 2.939%. Money is for improvement and expansion of the City Light distribution system.

• Bonneville Power Administration has awarded several contracts recently. **John M. King Co.**, Tacoma, will construct switchyard additions, relay houses No. 1 and No. 2, cable tunnels, oil house and transfer track for Big Eddy substation. Offer was for $416,600. **General Electric Co.** will supply power system relay equipment for $84,006 on invitation No. 7853. **Washington Utilities Construction Co.**, Tacoma, will do 18.7 miles of right-of-way work for $306,889. **Murray Bros. Construction Co.**, Bend, Ore., will receive $122,197 for 8.3 miles of right-of-way work. **Parkers Schram Co.**, Portland, has received a contract for relocation of Midway-Benton 230-kv transmission line No. 2 and Hanford Engineering Works 230-kv line No. 1 at Midway substation. Contract is for $23,969.

• A $250,000 contract for fabrication of 74 dam gates for The Dalles Dam has been awarded to **Food Machinery & Chemical Corp.**, San Jose, Calif., by the Northwest Division, Corps of Engineers.

• **Central Lincoln PUD**, Newport, Ore.. has authorized bid calls for two 5.000-kva substation transformers to be delivered later in 1956.

• British Columbia Electric Co. Ltd. has ordered $2,000,000 worth of oil-filled cable from **British Insulated Callenders Cables** Ltd. of England. No announcement has revealed where it will be used.

• **Mesa, Ariz.**, has purchased a new transformer station from **Allis-Chalmers Co.** for $114,141.

• **John Nuveen** & Co., Chicago, heads up an investment syndicate that has bought a $1,200,000 revenue bond issue of the Grant County PUD, Ephrata, Wash. Interest rate is 3.244%. Proceeds are for additions to the PUD's distribution system.

• **Puget Sound Power & Light Co.** is constructing a general office building at Bellevue, Wash. It will cost more than $15.000,000 including the site, and will have about 73.000 sq ft of space. Plans call for a 200-seat auditorium.

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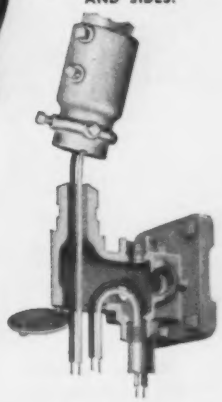

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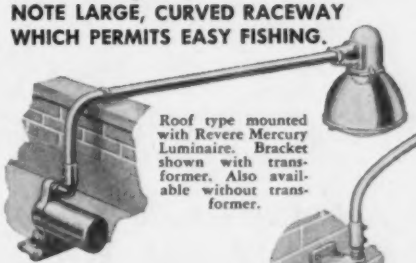
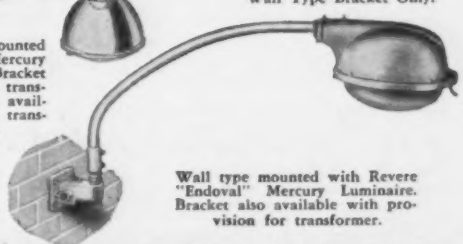
Wall Type Bracket Only.

NOTE LARGE, CURVED RACEWAY WHICH PERMITS EASY FISHING.



Roof type mounted with Revere Mercury Luminaire. Bracket shown with transformer. Also available without transformer.



Wall type mounted with Revere "Endoval" Mercury Luminaire. Bracket also available with provision for transformer.

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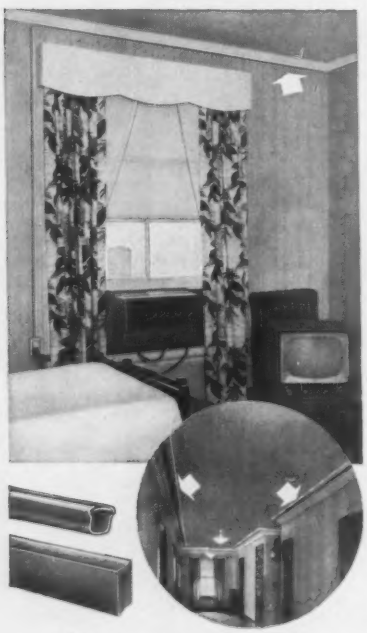

The wiring system in the **Elton Hotel in Waterbury, Connecticut,** was modernized with Wiremold 3000 raceway neatly installed in corridors, and Wiremold 200 carrying power into each room. The entire installation was completed without inconvenience to guests.

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Injunction Not Signed Against Cowlitz Work

The signing of a court order that would prevent Tacoma City Light from proceeding with its $134,000,000 Cowlitz River hydroelectric development has been delayed indefinitely.

Judge Charles T. Wright, who indicated Jan. 13 that he would grant an injunction against further expenditures on the project, has delayed the signing in order to study memoranda and affidavits submitted by the city.

City Light attorneys have presented the argument that Tacoma should be enjoined only "from building a dam which interferes with navigation" and that the injunction, if signed, should be set aside until the state supreme court can rule on the city's appeal.

Judge Wright is considering the injunction because of an old state law forbidding municipalities from building projects that would interfere with navigable rivers.

Edison Seeks More Gas To Use Instead of Oil

Southern California Edison Co. has filed with the public utilities commission for additional natural gas supplies to be used as an alternative fuel for generating stations.

The move was prompted by smog problems arising from the use of fuel oil.

In the application the company stated its purpose is to "gain equitable division of both new and available supplies" of natural gas. It pointed out that publicly owned power generating stations receive greater proportions of the gas than Edison.

The company also said the PUC would have to decide whether it would be more in the public interest for new supplies to be brought to the Los Angeles area through existing pipelines, or for Edison to build its own.

PP&L To Build Plant Near Glenrock, Wyo.

Plans to build a 100,000-kw steam-electric generating station near Glenrock, Wyo., have been announced by Pacific Power & Light Co. Construction is scheduled to begin soon.

The new plant does not rule out construction of another plant at Lake DeSmet, according to a joint statement by PP&L and Reynolds Mining Co. The Lake DeSmet supply of subbituminous coal is attractive to both the utility company and the Reynolds company. Reynolds is considering an aluminum reduction mill at the site.

NEWS ABOUT PEOPLE

Kempe

• **Fred Kempe,** advertising manager of Portland General Electric Co., has been appointed director of public relations and advertising. Kempe joined PGE in 1948 after three years' service as Pacific Northwest manager of the National Association of Manufacturers.

Porter

• **Arthur J. Porter,** formerly superintendent of production, is new power manager for Portland General Electric Co. His duties include planning of the

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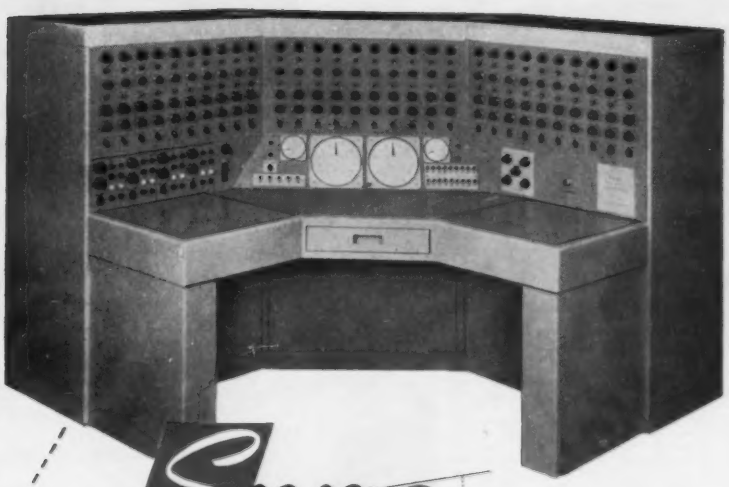

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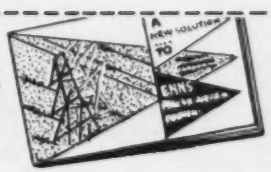
Write for detailed information.

Phantom photo: An AC network analyzer built for a U. S. Government Power Administration by Electronic Contractors, Inc.

Send for Detailed Brochure



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Blair

Three WWP Men Raised To Vice-presidencies

Washington Water Power Co. directors have named three men vice-presidents in recent organizational preparation for long-term growth of the company.

Appointed were Marshall L. Blair, vice-president in charge of power supply; Kimball I. Jack, vice-president in charge of sales, promotion and public information; and W. L. Thrailkill, vice-president in charge of operations.

• **Kenneth T. Coffman,** Corps of Engineers civil engineer, has been appointed acting project manager at Albeni Falls Dam. He succeeds **James F. Grafton,** who becomes project engineer for the Eagle Gorge Dam on the Green River in Washington.

• **Kinsey M. Robinson,** president of Washington Water Power Co., was re-elected president of the Pacific Northwest Power Co. at a meeting of the board of directors Jan. 27. All other officers and directors were re-elected.

• **Jerry J. Harrington** has been elected assistant treasurer of Montana Power Co. by the board of directors. He continues as auditor.

• **Harold Boehmer** is new chief engineer for Utah Power & Light Co. He succeeds **T. A. Burton** who retired and then joined Ebasco Services for consulting service in Greece.

Thrailkill

Jack

Deaths

• **Joseph M. Carlson,** 71, retired San Francisco electrical contractor, died Feb. 14 at his Menlo Park home. He headed the Central Electric Co. 50 years.

• **Fordys L. Hauser,** superintendent of Southern Nevada Power Co.'s steam plant at Whitney, died Feb. 9 at his home in Las Vegas.

• **Floyd W. Miles,** 69, retired former president of Local 77, IBEW, Seattle, died Jan. 18. He had served five terms as president and three years as secretary in his 49 years with the organization.

• **George F. Childs,** 64, chief accountant for Tacoma Light, died Jan. 30. He had been in the city's comptroller's office before transferring to City Light. He was made chief accountant in 1946.

ONE TON CAPACITY

Linemen call this hoist a "HONEY"

Designed especially for line work

Here's a strong, fast-operating, light-weight hoist (12 pounds) with a flexible steel load chain that won't kink, bind or uncouple. Controls can be worked without removing gloves. It's rated to lift a one-ton load and it's tested to 3000 pounds.

THIS CHANCE HOIST HAS ALL THE FEATURES LINEMEN WANT

- Well-balanced, easy-to-grip handle. . . operates from either side
- "Free-wheeling" for ease in hooking to load . . . automatic locking control prevents accidental dropping of load
- Half link and full link take-up for accuracy and speed
- Easy working swivel hooks on both chain and hoist housing
- Permanently lubricated oil-ite bearings
- All working parts fully enclosed in the housing to prevent injury to fingers.

A·B·CHANCE CO·

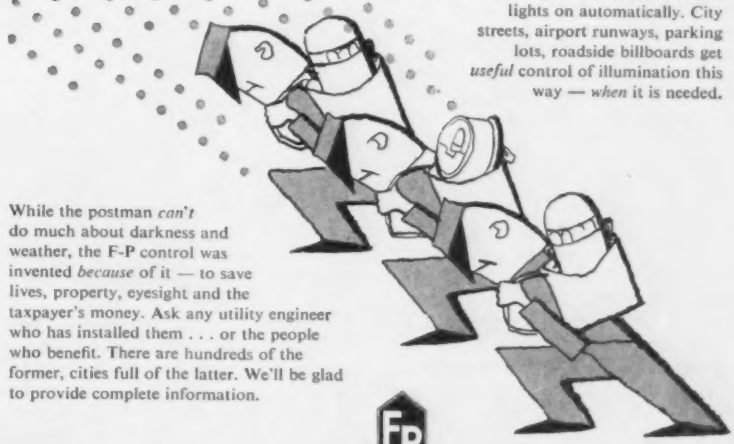
CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIALS

CT55-2

neither snow nor rain, nor heat nor gloom of night...

. . . can keep the dependable postman — or a Fisher-Pierce photoelectric lighting control — from "completing the rounds." Whether it gets dark at 3 o'clock in the afternoon or 8 at night . . . in any season and in any weather (as long as there's power) — F-P controls switch lights on automatically. City streets, airport runways, parking lots, roadside billboards get *useful* control of illumination this way — *when* it is needed.



While the postman *can't* do much about darkness and weather, the F-P control was invented *because* of it — to save lives, property, eyesight and the taxpayer's money. Ask any utility engineer who has installed them . . . or the people who benefit. There are hundreds of the former, cities full of the latter. We'll be glad to provide complete information.

FP

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43 Pearl Street, So. Braintree, Boston 85, Mass.

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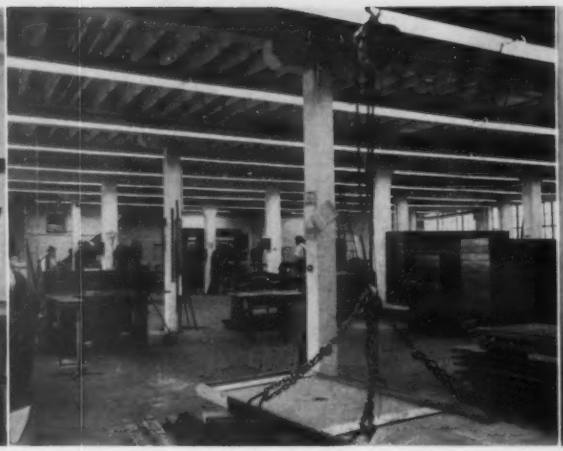

Variety, production and design are represented in these three pictures. Herst is at left, designer-engineer is Ray C. Dameral

NOTES ON THE TRADE

Peerless Electric Co. Expands Production

Sam Herst is a man that works pretty hard at "reviving the art of chandelier making," and is succeeding well enough at it that he recently added more production facilities to his Peerless Electric Co. plant at 576 Folsom St., San Francisco.

Since he started the company in 1932, Herst has applied the theories of varied design, specialized design and craftsmanship-type production to his lighting fixture manufacture. Over the years he has collected about 60 series of fixtures that are "repeaters," so he has set up a more nearly assembly line type of production for these.

He will quickly assure a questioner that he has not compromised the design and craftsmanship parts of his business policy. The new production department is an addition in its own right and does not detract from the specialized design and variety that has been the tradition of the business.

The recent expansion is the fourth for Peerless. It has also absorbed two other companies on the way up; Los Angeles Lighting & Supply and California Chandelier Makers.

Interesting to note, concerning the new production department, is that about 75% of the 60 series that will come from it are designed for incandescent lamps.

• **Lenkurt Electric** Co., San Carlos, Calif., has retained Frank Lloyd Wright, world famous architect, to design a new 90,000-sq-ft administration and engineering building. The company manufactures multichannel communication systems.

• **Robert E. Krueger** is now marketing manager of **Donner Scientific** Co., Berkeley. He heads sales and advertising for the company's instruments and analog computers.

• **Arthur M. Watson** has been named national sales manager of **Non-Linear Systems** Inc., Del Mar, Calif., and will direct sales of digital voltmeters, ohmmeters and luminous readout systems.

• **James L. Wrathall** has been appointed a sales engineer by **Taper Tube Pole** Co., San Francisco.

• **Ralph Davis,** Vancouver, B. C., is now a hydroelectric staff specialist with the consulting firm of Andwell & Co. Ltd.

• **Permaglas Division** of A. O. Smith Corp. has named **John L. Stewart** as West Coast heating and air conditioning specialist. He will headquarter at the A. O. Smith Oakland plant.

• **Cutler-Hammer** Inc. has completed a new 31,500 sq-ft plant in Los Angeles. The building will house manufacturing and warehousing facilities and the Los Angeles district sales office.

• **Okonite** Co. announces that **John D. Fess,** Northwest manager, Portland, has been promoted and transferred to Pittsburgh, Pa. He will be succeeded by **James B. Caldwell Jr.** of Los Angeles, who will have the title of branch manager, and **Edwin R. Conklin,** Seattle, who will serve the State of Washington.

• **Edwin G. Lowell** is a new member of the technical staff of **Atomics International** division of North American Aviation Inc. He is president of the Chapter of the Society of Professional Engineers. For Atomics International he will be engaged in determining new applications of power produced by nuclear reactors.

• **Reynolds Metals** Co. has appointed **James MacIntyre** plant manager at Troutdale, Ore. **Lester Wolgast** is new electrical superintendent, and **R. A. Sanborn** is now assistant manager of the Longview, Wash., plant.

• **W. H. Mixter,** new president and general manager of **H. R. Basford** Co., San Francisco, has announced the appointment of **Robert B. Lees** to the post of vice-president and manager of the company's water heating, heating and air conditioning division. **Otto B. Barth** is sales manager of the division.

• **Ruby Lighting Corp.,** Los Angeles, is currently negotiating for a 60,000-sq-ft building with 25,000 sq ft of parking area for future expansion. **Albert Jassim** heads the organization.

• **J. F. Cady** Co., San Francisco, is the new representative for **Furnas Electric** Co., Batavia, Ill. Former representative was **Charles A. Meier,** who now maintains his agency service from 134 N. Mayfair Ave., Daly City, Calif., and still represents Curtis Development, Reliance Automatic Lighting and Allen & Olsen Mfg. Co.

• **Subox** Inc. has appointed two new West Coast representatives. **R. E. Cunningham & Son,** 530 W. Sixth St., Los Angeles, and **Waltham, DeWitt and Krusi,** 630-632 Monadnock Bldg., San Francisco 5, Calif., are the new agents. In Portland, the company is represented by William J. Cottrell and Associates.

ROCKBESTOS VARNISHED-CAMBRIC CABLE

Quality Engineered to Provide Superior Performance

NOTE THESE UNUSUALLY HIGH STANDARDS FOR VARNISHED-CAMBRIC TAPES

Rockbestos VC tapes are made to our own exacting specifications which incorporate all the requirements called for in all IPCEA Standards.

PLUS

- A special surface treatment applied to insure that the tape will wrap properly to provide uniform dielectric strength and good bending characteristics in the completed cable.
- More rigid tape thickness requirements to insure uniformity of cable diameters.
- Rockbestos special Surface Hardness Test, not found in industry standards, insures varnish film that will not become damaged in processing or handling which the cable may get in service.
- Controlled methods of application of tapes avoid overstress of tapes assuring uniform dielectric insulation throughout the entire length of the cable.
- Add to this thirty years of know-how in the application of VC tapes for high temperature application on Rockbestos AVC cables and you have a VC cable that insures trouble-free operation and long life.

Rockbestos Braided *Varnished-Cambric* cables are stocked in 600 volt and 5,000 volt ratings for *immediate delivery*.

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PRODUCTS CORPORATION
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PROFILES

Gar Morse, Pacific district manager for Sylvania Electric Products Inc., was happy over announcement by Don G. Mitchell, chairman and president of Sylvania, that a new Pacific region office headquarters and San Francisco district sales office and warehouse was to be constructed in the Millsdale industrial tract near San Francisco Airport for September opening. Mitchell told the press Sylvania is already the largest supplier of fuel elements for atomic reactors, a step into the future with which it means to keep pace

Morse Mitchell

At the San Francisco Winter Market last month were Mrs. Everett E. Moore; W. W. Baxley, Lindsay Electric Shop, Lindsay, Calif.; Gordon Smith, San Francisco district manager, G-E Major Appliance Division; Kenneth Hampton, Valley Electrical Supply, Fresno; Everett E. Moore, Abbott Electric, Hanford, Calif.

Meeting during the San Francisco Market were these association managers and representatives: Victor Hartley, Pacific Coast Electrical Assn. director-manager; Clark Chamberlain, San Diego Bureau of Home Appliances secretary-manager; George Cane, Sacramento MUD, representing the Sacramento Valley Electrical League; Bill Johnson, Appliance Merchandisers Assn. manager, Phoenix; Bert Reynolds, manager, Northern California Electrical Bureau; E. F. Perkins, regional manager, PCEA; W. A. Cyr, Electrical West

Burney, California
sees itself in a new light!

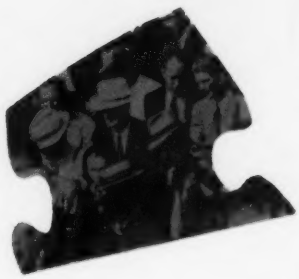
A year ago, Burney's Main Street was shrouded in near-darkness. Then P. G. and E. made a free survey, submitted a plan for bringing the lighting up to date—and today safe, efficient illumination floods the entire street. Cost? Nothing for the survey or plan, or installation of the new lights, and not a cent in invested capital for improved lighting. *Burney's only cost is a nominal increase in monthly electric bills . . . to cover the additional electricity used by its larger mercury bulbs.*

P. G. and E. has already shown 80 Northern California cities—large and small — how to eliminate dangerous, out-dated street lighting. Our engineers will be glad to do the same for *your* town. There's no charge or obligation of any kind, of course.

Al Meeker, Shasta County Supervisor, says: "The new mercury vapor street lights certainly have a great effect on the appearance of the town. I hear a lot of nice comments on how they provide the public with a good view of town, especially on dark and stormy nights. In fact, they make Burney look like a small city and have a good effect on the tourist trade."

P·G and E·
Pacific Gas and Electric Company

For a free survey of your city's street lighting, contact your local P. G. and E. office



Solid "SELL"

Specifying Adequate Wiring in a home is a job which belongs to the architect and builder. Installing it is properly the function of the electrician. *Selling* Adequate Wiring is less specialized work . . . it is *everyone's* business, in this business!

Yes, it is your *business* if you are a part of the electric industry. These days, Adequate Wiring is basic in a home . . . as necessary to lasting livability and value as a solid foundation is to building stability. In fact, it is a solid foundation . . . one on which to build architect and contractor reputation, investment soundness, equipment sales and customer satisfaction. Whatever your part in the picture, you'll find it worth while to make Adequate Wiring a part of every sale you make.

What more information? The Certified Adequate Wiring program is one of our major activities. Call or write either of our offices . . . there is no cost or obligation.

Pacific Coast Electrical Association

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